

61/C

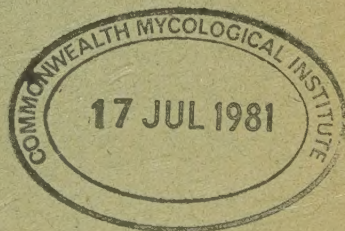
Price: Rs. 30.00



Annual Report
OF THE
Ministry of Agriculture
AND
Natural Resources and
the Environment
for the year 1978

No. 10 of 1980

IF	
RPP	
RMVM	
BSM	



PRINTED AND PUBLISHED BY
E. F. PRODANO, ACTING GOVERNMENT PRINTER,
PORT LOUIS, MAURITIUS
OCTOBER 1980



Annual Report
OF THE
Ministry of Agriculture
AND
Natural Resources and
the Environment
for the year 1978

PRINTED AND PUBLISHED BY
E. F. PRODANO, ACTING GOVERNMENT PRINTER,
PORT LOUIS, MAURITIUS
OCTOBER 1980



Digitized by the Internet Archive
in 2025

THE MINISTRY OF AGRICULTURE AND NATURAL RESOURCES
AND THE ENVIRONMENT

(Agricultural Services),

Reduit,

12th July, 1979.

SIR,

I have the honour to submit the Annual Report of the Agricultural Services for the year 1978.

I have the honour to be,

Sir,

Your obedient Servant,

B. D. ROY,

Chief Agricultural Officer.

THE HONOURABLE THE MINISTER OF AGRICULTURE

AND NATURAL RESOURCES AND THE ENVIRONMENT,

MINISTRY OF AGRICULTURE AND NATURAL RESOURCES

AND THE ENVIRONMENT,

PORT LOUIS.

Annual Report of the Ministry of Agriculture and Natural Resources (Agricultural Services) for the year 1978

I. Introduction

1.1 In virtue of the powers conferred upon the Minister by sub-section (i) of section 3 of the Ministry of Agriculture and Natural Resources (Integration) Ordinance, 1963, as subsequently amended, the powers and duties exercisable under any law in force by the Chief Agricultural Officer have been transferred to the Permanent Secretary under the Ministry of Agriculture and Natural Resources (Transfer of Power and Duties) Order 1972 made on the 31st January 1972 and which came into force on the 5th of February 1972.

1.2 The Chief Agricultural Officer advises the Permanent Secretary on matters referred to him—policy, administrative and technical. He is responsible for the planning, coordination and execution of the work of the different divisions of the technical services of the Ministry, which, except for the Forestry Service, are grouped in the Agricultural Services. He is assisted by three Principal Agricultural Officers. Principal Agricultural Officer (Crops), Mr. L. Lutchmeenaraidoo, was responsible for the coordination and implementation of the approved programme of work of divisions involved with crop production, viz: Agricultural Division, Crop Experiment Stations, Plant Pathology, Entomology and General Chemistry; Principal Agricultural Officer (Livestock), Mr. R. Brunet, was responsible for the coordination and implementation of the programme of work of the Animal Production Division, Livestock Breeding Stations, Animal Health Division, Dairy Chemistry Division and Rodrigues Division; and Principal Agricultural Officer (Development), Mr. T. M. Narain, was responsible for the coordination and implementation of the programme of work of the Extension Services Division, Land Use and Environment Division, Projects Division, Engineering Division and Field Services Division. The Cane Planters and Millers Arbitration and Control Board falls technically under the responsibility of the Chief Agricultural Officer.

1.3 The Chief Agricultural Officer and the Principal Agricultural Officers also serve on a number of Boards and Committees either as Chairman or as members. These Boards and Committees are listed at Chapter II. They fall under the responsibility of the Ministry of Agriculture and Natural Resources and the Environment. They submit their own Annual Reports. This report deals with the work carried out by the professional, scientific and technical officers in the Agricultural Services.

1.4 Research on rice is now confined only to Belle Vue Station in Black River district. The Ministry of Agriculture and Natural Resources and the Environment is very grateful to the management of Flacq United Estates Limited for the facilities they have offered to us, their cooperation, understanding and keen interest in the implementation of rice research undertaken by the Ministry on their estate as from April 1969 until the end of this year. The estate provided all the facilities in terms of land, labour, insecticides and fungicides. The Ministry provided fertilizers and harvested the crop and the costs incurred by the estate were refunded. This collaboration has allowed costs to be maintained at the lowest possible level. The participation of F.U.E.L. in the rice research programme has provided a basis of comparison to be established with other experimental sites of different agro-climatic conditions in the country. Their cooperation has been most valuable.

1.5 The five tea seed gardens at de Rauville, Parc aux Cerfs, Nouvelle Découverte, Salazie and Midlands totalling 70 arpents have now been closed and are no longer producing seeds for sale. These gardens were very useful in the past in that they provided the whole demand for tea seeds, mainly for the Tea Development Authority and other growers. The planting programme of the Tea Development Authority has now been completed. Plants are required only for recruiting which is done now entirely with vegetative material. From 1972 to 1976, 26,400 lb. of tea seeds were sold to the Tea Development Authority and other planters.

1.6 Utilisation of local products and by-products in animal feeding has been one of the features of research for the Animal Production Division under the guidance of Dr. T. R. Preston, the FAO Consultant to the Ministry within the project "Milk Production and Processing". Presently, attention is also being focused on the use of poultry litter as a source of non-protein nitrogen and energy for ruminant feeding.

1.7 In order to promote further research facilities, a ruminant research laboratory is going to be operational by mid 1979 with the help of UNDP. Special apparatus, such as Gas Liquid Chromatograph, were received during the year and Professor R. A. Leng of the University of New England, Australia came in March to set up the gas chromatograph. Since then physiological studies of rumen fluid from animals undergoing experimentation have been undertaken. Dr. J. B. Rowe of Australia who came in April demonstrated the technique of rumen fistulation on 4 young bulls which are now utilised for digestibility studies.

1.8 During the year one wing each of the milk/beef feedlot at Richelieu and Palmar Livestock Breeding Stations was ready, complete with milk parlour and milk room. The other wing is due to be ready by the middle of next year. Milking machines were installed with the help of a technician from the Ruakura Company, New Zealand which supplied the equipment. Milking started in March at Richelieu and in August at Palmar. Miss Elizabeth Philippo, the FAO Dairy Technical Officer, is helping in training stockmen in machine milking and with the husbandry practices of milch animals at both stations. Stockmen from the private sector were also trained in machine milking at Richelieu under the guidance of Miss Philippo.

1.9 The Friesian crossbred calves (Creole, Sahiwal and Siementhal) are now under close observation at Richelieu Livestock Breeding Station; and their performance in terms of milk and meat will be the basis of selection of the crossbred suited for our purpose. The cow at both Richelieu and Palmar are being milked once daily and the calves are being raised by restricted suckling. So far the average daily production has been 6 litres per head. However, the performances of the dairy cows under feedlot condition will be known only after they have completed a full lactation.

1.10 Biogas production from effluent of cattle under feedlot condition was also investigated. Different retention times in a digester showed that increase in retention time was accompanied by a decrease in the amount of gas produced daily.

1.11 The livestock sector received the visit of Mr. A. Tacconis from Centre for Industrial Development under Lomé Convention of ACP-CEE in connection with a request for financial assistance for the development of milk and meat production. Following his report recommending the use of a product containing urea chemically linked in molasses as a high substitute to natural proteins in cattle feed, a mission which included the Divisional Scientific Officer (Animal Husbandry), went to France and Belgium to examine the use of that feed technology. Arrangements are in hand for testing the chemically linked molasses-urea product under local conditions.

1.12 The Chief Agricultural Officer accompanied by the Acting Principal Agricultural Officer (Livestock) and Divisional Scientific Officer (Animal Husbandry) joined other members of the Mauritius Meat Producers' Association in their field visits which took place on 27th March 1979. Visitors were shown the dairy and the feedlots at Union Sugar Estate. The building to house the target capacity of 300 dairy cows and 150 feedlot animals at Union Sugar Estate was under construction on more or less the same pattern as the feedlot at Richelieu Livestock Breeding Station. At Bel Ombre visitors were shown the Jumbo system of fattening feeders on semi-intensive method by grazing the animals on star grass supplemented with molasses urea mixture. The deer feedlot at Case Noyal, a new venture by Bel Ombre Sugar Estate, was also shown. Deer apart from grazing are supplemented with feedlot concentrate and molasses urea mixture. At Saline Koenig visitors were shown the performance of imported feeders from South Africa. The feeders grazed on acacia pasture and supplemented with feedlot concentrate and molasses urea mixture were obtaining a daily live weight gain of 810 grammes. After the visit a discussion took place at La Bonne Chute where most members of the Mauritius Meat Producers' Association expressed their view on livestock production in Mauritius. The Chief Agricultural Officer stressed that the various divisions of the Agricultural Services of the Ministry are always ready to assist the Private Sector whenever they are called upon. Officials of the Mauritius Meat Producers Association expressed their appreciation and thanks to the Ministry for the encouragement and assistance provided to them for livestock production.

1.13 In an animal exchange programme, 12 piglets of the Saddleback breed were received from Seychelles and two bulls of the Sahiwal breed were sent by us. The Saddlebacks which comprise 4 males have been integrated within the pig herd at Palmar to obtain hybrids with Large White and/or Landrac blood for sale to breeders as piglets.

1.14 The year saw the completion of a set of new buildings in the context of an expansion in the chick production facilities at the Poultry Breeding Unit. The expansion comprises 8 breeding houses for parent stock, 4 brooding houses and a new hatchery equipped with two incubators of 28,000 egg capacity each from Nova-Backeye. The new installations which increase the potential chick production capacity fourfold will help to meet the increasing demand for day-old chicks in general and poultry layers in particular.

1.15 For the first time since many years the Extension Service has been fully staffed and it has been possible to reorganise the service along lines that have been under discussions since 1974. There is now a combined service for both crop and livestock extension work. The island is divided into twenty-five zones with a Technical Officer responsible for each zone. The zone is sub-divided into ten sub-zones each of which is visited once fortnightly. The Technical Officers are supported at a higher level by two Scientific Officers, one Agricultural Superintendent, seven Senior Technical Officers for extension work and three other Senior Technical Officers for audio-visual, information and rural youth and at a lower level by Senior Field Assistants, Field Assistants and Agricultural Trainees of whom there are thirty.

1.16 A European Development Fund mission comprising delegates from EEC member countries visited Mauritius in April/May 1978. The objective of this visit was to examine progress and implementation of projects included in the fourth EDF indicative programme for the period 1976-1980. Phase I of the Western Coastal Region Irrigation Project, viz. La Ferme System, is of particular interest to this Ministry. The project area was visited by the whole team ending up with a visit to the Rice Farm at Belle Vue, which shows the potential of the area for rice cultivation when adequate irrigation water is available for at least two crops and with rational land use planning.

1.17 Staff: In previous reports, mention was made of the large intake in the past few years of new graduates and diploma holders to fill posts that had long remained vacant for lack of qualified candidates. A training programme is under way for improving their skill in their respective disciplines. 1978 has been a particularly fruitful year in this respect. Many training opportunities were offered by various governments and international organisations, to whom we express our thanks.

The following officers followed seminars or training courses or post-graduate courses leading to higher degrees in the course of the year: G. M. Lallmahomed, Research project on bacterial wilt (Ph.D.thesis), in Nigeria; I. Rajkomar, M.Sc. (Crop Science), in Canada; M. Ramtohul, M.Sc. (Horticulture), in U.S.A.; H. Rojoa, M.Sc. (Crop Science), in Trinidad; K. Ramdoyal M.Sc. (Agronomy), in France; M. N. Ramanjooloo, Diploma in Soil Science, in U.K.; H. Gaya, Diploma (Animal Production), in U.K.; M. Chinapen, International Course on Plant Protection, in the Netherlands; J. Mahder, 23rd FAO Inter-Regional Dairy Training Course (Milk Production), in Denmark; S. Ramessur, "Production Animale. Intensification de la Production de Viande aux endroits à climat tropical", in Germany; V. Domun, Training Course in Integrated Surveys, in the Netherlands; M. Pillay, Phytosanitary Control, in Egypt; D. Ramessur, Agricultural Production Course, in Egypt; Y. L. Kong Ting Lun, Course in Plant Production and Protection, in Egypt; R. Maurice, Training Course on Contagious Bovine Pleuropneumonia, in Kenya; R. Brunet, Livestock Development Projects Course for the African Region, in Kenya; T. S. Ramyeed, Training Course on International Referral System, in Egypt; L. K. Mapoon, (i) Study Tour: Laboratory Technology and Research Methods on Rumen Digestion, (ii) 2nd International Meeting on Utilisation of Sugarcane for Animal Nutrition, in Mexico; I. Balluck, Training Course on Components Essential for Ecologically Sound Pest Management System, in Kenya; and K. Ramdaursing, FAO Study Tour on Irrigation Drainage and Water Management.

II. Boards and Committees

The Permanent Secretary or his representative served on the following Boards and Committees:—

Agalega Corporation Board

Agricultural Marketing Board

Board of Agriculture, Natural Resources and the Environment

Board of Examiners for the Registration of Agricultural Chemists

Cane Planters and Millers Arbitration and Control Board

Cane Release Committee

Institute of Education Council

Irrigation Committee

Land Settlement Committee

Mauritius Meat Authority

Mauritius Sugar Industry Research Institute Executive Board

Mauritius Sugar Industry Research Institute Advisory Board

Mauritius Sugar Syndicate

Mechanical Loading of Sugarcane Committee

National Road Safety Committee

Pesticides Control Board

Revue Agricole Editorial Board

Rose Belle Sugar Estate Board
Sugar Industry Development Fund Committee
Sugar Insurance Fund Committee
Sugar Millers Development Fund Committee
Sugar Planters Development Fund Committee
Sugar Planters Mechanical Pool Corporation Board
Tea Board
Tea Development Authority
Tobacco Board
University of Mauritius, Senate
University of Mauritius, Council

III. Board of Agriculture, Natural Resources and the Environment

3.1 The Board functions under Act No. 2 of 1977. It advises the Minister on all matters of general policy relating to agriculture, forestry and the utilisation and preservation of natural resources and the environment.

3.2 The following Advisory Committees were set up for specific purposes, and function under the aegis of the Board :—

- (a) The Land Settlement Committee
- (b) The Cane Release Committee
- (c) The Man and Biosphere Advisory Committee.

3.3 The Board met in June. Recommendations were made for the composition of the Sub-committees of the Board: Cane Release Committee, the Land Settlement Committee and the Man and Biosphere Committee.

3.4 The Land Settlement Committee met twice during the year. At the first meeting, held in April, the question of renewal of leases was the main item considered. It was agreed to renew the leases with all good tenants. At the second meeting nine cases of transfer were approved; also representations made by a group of tenants from Terre Rouge Land Settlement were examined.

3.5 The Cane Release Committee met once during 1978 to review the performance of cane varieties that have reached the final stages of testing. Of the seven varieties planted in M5 nurseries, M2173/63 was recommended for release. This variety has been confirmed as a serious challenger to S17. Its yield tends to be below average but this is largely compensated by a very high sucrose content. It is resistant to yellow spot and gumming disease. However, it has shown susceptibility to smut and is not to be planted in sub-humid areas.

The decision on the other six varieties was postponed until more information becomes available in the next few years.

3.6 The Man and Biosphere Advisory Committee has been set up to advise the Ministry on matters relating to the environment. The Committee met six times during the year. Amongst others, the following environmental problems were discussed: the pollution of beaches by tar balls, the use of pesticides, and the pollution of rivers. The Committee also published 4,200 copies of a revised version of the booklet "Our Environment—Mauritius".

IV. Comité de Collaboration Agricole Maurice—Réunion—Madagascar

4.1 The twenty-sixth conference of the Committee was held in Reunion on the 20th October 1978. Five representatives from Mauritius, including the Secretary of the Mauritius Committee, and five representatives from Reunion, including the Secretary of the Reunion Committee, attended the meeting. The Fiji disease of sugarcane which is prevalent in Madagascar continued to cause serious anxiety to both delegations. In the course of the year, there has been the usual exchange of scientists and technicians between the two countries. Under this exchange programme a Scientific Officer (Plant Pathology) attended the International Seminar organized in Reunion on virus diseases of fruit trees with special reference to citrus trees. The Chief Agricultural Officer and the Principal Agricultural Engineer also visited Reunion to see progress in various fields including horticultural crops, livestock development, irrigation projects and farm mechanisation and equipment. This Conference coincided with the Second International Congress of the Association Réunionnaise pour le Développement de la Technologie Agricole et Sucrière (ARTAS) which took place also at St. Denis from the 16th of October to the 20th of October, and which was attended by a very large delegation from both sides.

V. The Sugar Industry

CROP RESULTS

5.1 The persistent drought period delayed the start of sugar cane growth until December 1977. Adequate rainfall afterwards accounted for some moderate growth. The cyclonic conditions prevailing on the passage of "Fleur" east of Mauritius caused some damage to the growing canes, although the accompanying rainfall had beneficial effects.

Rainfall and thunderstorms in April favoured rapid growth. However, a deficit rainfall was again noted in May and June.

On the whole, deficient rainfall in the period up to December and in February and March adversely affected the normal growth of the cane during this period. However, moisture conditions which improved later helped in the yield of a very satisfactory total cane production.

The total output of sugar amounted to 665,219 tonnes.

5.2 Hereunder are some of the crop results compared with those of 1977:—

		1977	1978
Area cultivated (arpents) (total)	...	206,500	206,610
Area reaped (arpents) (total)	...	191,276	190,194
Area reaped (arpents) (estates)	...	105,050	83,989
Cane produced (metric tons)	...	6,022,285	6,260,483
Sugar produced (metric tons) 98.5° Pol	...	667,327	667,178
Commercial sugar 98.7° Pol	...	665,435	665,219
Tons of cane per arpent (metric)	...	31.5	32.9
Tons of sugar per arpent (metric)			
@ 98.7° Pol	...	3.48	3.50
Yield of sugar per cent cane	...	11.05	10.63
Crushing rate, hourly, metric tons	...	109.0	111.5
Crushing rate, daily, metric tons	...	2,099	2,176

CANE VARIETIES

5.3 In order of importance, the main varieties making up the 1978 crop were the following on estate land: S. 17, M 13/56, M 377/56, M 93/48. These varieties accounted for 85% of the crop. The remaining 15% were made up of M 351/57, M 31/45, M 124/59, M 438/59, B 51129 and a few other varieties each grown to the extent of less than 1%.

QUOTAS AND PRICES

5.4 The negotiated price for a quota of 510,119 metric tonnes under the Common Market Agreement during the period 1st July 1977 to 30th June 1978 was around £221 per tonne, including the Monetary Compensatory Amount.

EXPORTS

5.5 The exports of sugar were as follows:—

Destination		Long Tons	
		1978	1977
United Kingdom	...	439,603	528,782
Canada	...	39,576	44,186
U.S.A.	...	91,193	53,651
Eire	...	—	4,877
France	...	6,350	—
Italy	...	18	2,433
Seychelles	...	—	1,196
Comoro Islands	...	1,850	1,290
Republic of Niger	...	—	10
Jordan	...	42	—
TOTAL	...	578,632	636,425

Apart from the sugar exported, there were 37,906 tons consumed locally.

MOLASSES AND ALCOHOL

5.6 The production of molasses for the crop amounted to 201,643 metric tons and the quantity exported during the calendar year was 156,937 metric tons. As in the previous years, molasses were used for the manufacture of rum and various alcoholic products; 604 tons of molasses were used for the preparation of cheap cowfeed at St. Antoine at the request of the Ministry of Agriculture. Medine Sugar Estate produced some 166,780 litres of vinegar and 1,093,696 litres of alcohol, Solitude produced 1,363,309 litres of alcohol and 32,543 litres of perfumes at 100° G.L. and St. Antoine 1,055,410 litres of alcohol.

VI. The Cane Planters and Millers Arbitration and Control Board

HEAD OF DIVISION: A. A. AUMEERALLY, GENERAL MANAGER

6.1 The Board operated under "The Cane Planters and Millers Arbitration and Control Board Act 46 of 1973 and No. 26 of 1976". The executive machinery of the Board was run as a division of the Ministry of Agriculture and Natural Resources and the Environment.

MEETINGS OF THE BOARD

- 6.2 The Board held 10 meetings during the year as follows:—
- 3 meetings in connection with the assessment of sugar to planters
 - 2 meetings in connection with representation received from planters
 - 2 meetings in connection with applications for separate tests
 - 3 meetings in connection with change of factory areas—mechanical loading—weighing of "Cameco" lorries—core sampling—closing of weighbridges—excess bagasse.

During these meetings were also discussed: spare parts for core sampling equipment, working hours in laboratories, road rate formula, special export duty on sugar, cost of loading.

6.2.1 A Committee of the Board was set up to deal with the problem of excess bagasse according to Section 31(3) and 31(4) of Act No. 46 of 1973.

6.2.2 At the request of the Board a Technical Committee was appointed by the Ministry of Agriculture and Natural Resources and the Environment to look into the problems arising from mechanical loading of canes and to make recommendations thereon.

6.2.3 A Committee has also been set up to review the road rate formula.

CANE TESTING

6.3 The canes supplied by 679 planters or group of planters were tested separately. The total number of tests carried out was 184,504 by use of core sampling equipment.

ASSESSMENT OF SUGAR

6.4 Following the publication of the final assessment of sugar for the 1977 crop, 3 planters lodged protests against the assessment made by the Board. One of the planters concerned failed to attend before the Board and his case was rejected. However, after hearing the other two planters, the Board maintained its previous assessment.

TRANSPORT COSTS

6.5 The final assessment of road rates for the 1978 crop was issued in November 1978. The approved rates were as follows:—

- (1) Millers were entitled to claim Rs 3.86 for the first ton mile and .51 cs. for each additional ton mile in respect of canes transported from outlying weighbridges to factories. The maximum mileage claimable was 4 miles.
- (2) Planters who had themselves caused their canes to be delivered to factories were entitled to a refund of .51 cs. per ton mile for each mile over and above a distance of four miles.

DELIMITATION OF FACTORY AREAS

6.6 Two applications for change of factory area were received by the Board. One application was rejected by the Board whereas in the second case an agreement was reached between the parties.

PERMITS TO MIDDLEMEN

6.7 Twenty permits to act as middlemen were issued.

CANE CONTRACTS

6.8 There were 9,910 cane contracts registered by the Board covering some 35,926 planters. The number of planters who failed to enter into contract before the 31st May totalled 681 compared with 606 in 1977.

CANE VARIETIES

6.9 During 1978 the varieties approved for planting were the same as from 1977 crop, namely:—

M 134/32 (red, white and striped)	M 351/57
M 31/45	M 124/59
M 202/46	M 438/59
M 93/48	M 377/56
M 99/48	E 1/37
M 253/48	E 50/47
M 442/51	B 37172
M 409/51	B 37161
M 13/53	B 51129
M 356/53	N. Co. 376
M 13/56	S. 17

CONTROL OF WEIGHBRIDGES

6.10 The number of weighbridges in operation was 74. All the weighbridges were tested for accuracy prior to the beginning of the crop. Sixty five were found correct on first examination, six on second examination and the remaining three on third examination. All weighbridges were again tested for accuracy on seven occasions during the crop.

SURPRISE CHECKS CARRIED OUT AT WEIGHBRIDGES DURING THE CROP

6.11 During the crop, 1,350 surprise checks were carried out and 1,318 vehicles were reweighed (1,158 lorries and 160 carts).

VII. Agricultural Division

HEAD OF DIVISION: DR. A. L. OWADALLY, DIVISIONAL
SCIENTIFIC OFFICER

7.1 The Agricultural Division studies the agronomy of economic crops such as tea, tobacco and wide range of food crops and some fruit and ornamental crops. The screening of varieties is being carried out yearly in order to find out suitable varieties likely to adapt well to agro-climatic conditions prevailing in Mauritius. The cultural practices in terms of plant population, fertilization, weed control, control of diseases and insect pests etc. are being investigated with a view to maximize yield and to improve the quality of the agricultural produce.

SCIENTIFIC OFFICER: L. LI KWAN PUN

7.2 Rice (*Oryza sativa*)**7.2.1 Variety trial**

Two variety trials were conducted at Queen Victoria, Flacq. The first trial was performed during January-May and the second one during July-December cropping seasons. A randomised block layout with four replicates was used in both trials and TN1 variety was used as control. These four varieties viz:—Kwang Loo i no. 4, Red Plum Zao, Chen Chu i no. 11 and Nanking no. 11 were compared to TN1.

7.2.2 Results

TABLE 7.1

MEAN PADDY YIELDS IN METRIC TONS HA—1			
<i>Variety</i>		<i>1st trial</i>	<i>2nd trial</i>
Red Plum Zao ...	...	7.87	4.12
Chen Chu i no. 11 ...	...	7.35	10.21
Nanking no. 11 ...	...	7.13	8.08
Kwang Loo i no. 4 ...	...	5.90	3.23
TN1 control ...	...	4.41	10.64
L.S.D. 5% ±	...	1.05	2.71
L.S.D. 1% ±	...	1.47	3.81

In the first trial, Red Plum Zao was the best yielder followed by Chen Chu i no. 11. The late maturing variety TN1 was seriously affected by panicle neck blast disease during grain filling stage resulting in very poor yield. The varieties Chen Chu i no. 11 and Nanking no. 11 were also slightly affected by the same disease.

7.2.3 In the second trial, the control variety TN1 outyielded all the other varieties followed by Chen Chu i no. 11. No significant difference in yield existed among TN1, Chen Chu i no. 11 and Nanking no. 11. The individual paddy yield of Red Plum Zao and Kwang Loo i no. 4 was poor and was highly significant in difference when compared to the remaining varieties.

The paddy yields of Chen Chu i no. 11 and Nanking no. 11 are comparable to the control variety TN1 but their growing cycles are slightly shorter by about ten days. These varieties are recommended as alternatives to variety TN1.

7.2.4 Seasonal sowing observation

Three sowings were carried out at Queen Victoria, Flacq under flooded conditions. One in mid-January, one in late May and one in mid-July. The following rice varieties were used:—Kwang Loo i no. 4, Red Plum Zao, Chen Chu i no. 4, Nanking no. 11 and TN1 (control).

7.2.5. Results

TABLE 7.2
AVERAGE OF 6 HILLS

Sowing	Variety	Plant height cm.	Tillers and plants per hill	Panicle per hill	Panicle length cm.	Total seeds per panicle	Full seeds per panicle	1,000 grain weight gm	Sowing to harvest days
Mid-January	Kwang Loo i No. 4	54.7	15.0	15.0	14.5	81.7	70.4	25.7	113
	Red Plum Zao ...	60.3	11.5	11.5	15.3	90.3	81.5	26.4	118
	Chen Chu i No. 11	76.0	15.7	15.7	19.2	103.6	87.1	21.9	121
	Nanking No. 11 ...	72.7	13.5	13.5	19.2	108.2	91.5	26.5	128
	TN1 ...	71.5	23.8	23.8	16.7	79.3	68.4	23.1	139
Late-May	Kwang Loo i No. 4	47.5	19.2	14.5	10.5	49.6	38.5	21.6	161
	Red Plum Zao ...	56.5	22.5	18.0	13.7	63.7	47.8	21.9	164
	Chen Chu i No. 11	62.5	22.8	19.0	13.5	71.5	54.7	21.7	170
	Nanking No. 11 ...	59.8	24.2	17.0	15.3	73.2	56.1	22.3	175
	TN1 ...	56.0	23.8	18.0	14.0	68.3	51.4	22.6	181
Mid July...	Kwang Loo i No. 4	55.7	26.5	21.3	15.3	91.0	86.5	29.0	146
	Red Plum Zao ...	61.7	17.8	14.2	16.3	113.3	106.0	28.5	152
	Chen Chu i No. 11	71.7	18.0	14.0	18.8	105.3	96.8	30.0	158
	Nanking No. 11 ...	71.0	13.0	11.2	18.8	117.3	102.5	30.1	160
	TN1 ...	76.5	18.7	14.3	19.2	102.0	84.7	30.2	162

The crop cycle of each variety in the late May sowing was longer than the corresponding other two. Also the panicle lengths were shorter, number of full seeds fewer and thousand grain weight lower.

It can be concluded that rice sowing in May is not recommendable at all. The growth cycle irrespective of early or late maturing variety is longer than those sown in either January or mid-July, as the number of full grains and thousand grain weight of seeds from the May sowing are less and thus resulting in poorer yield.

7.3 *Mushroom Volvariella volvacea*

7.3.1 Three trials with no replication were carried out at Richelieu Experimental Station inside a converted tobacco barn.

7.3.2 The first trial was carried out from 23.2.78 to 28.4.78. Three treatments T_1 , T_2 and T_3 were used. 5 kg and 10 kg of cow manure were incorporated in T_1 and T_3 respectively, whereas in T_2 , only rice straw was used and acted as control. Each straw heap/straw heap+cow manure weighed 100 kg. The total fresh weights of mushroom collected were 6.85 kg, 7.55 kg and 6.50 kg for T_1 , T_2 and T_3 respectively.

7.3.3 The second trial was effected from 4.7.78 to 17.8.78. There were two treatments T_1 and T_2 . Each straw heap weighed 100 kg. T_1 was sprayed with 10 litres of 3% aqueous urea solution at 45°C three weeks after piling and untreated T_2 as control. The yields of fresh mushroom were 7.26 kg and 7.50 kg T_1 and T_2 respectively.

7.3.4 The third trial lasted from 26.10.78 to 21.12.78. Three treatments T_1 , T_2 and T_3 were used where T_2 served as control. T_1 was sprayed with 10 litres of 3% aqueous urea solution and T_3 with 10 litres of 1.5% aqueous urea solution both at 45°C on 22.11.78. The respective fresh mushroom yields of T_1 , T_2 and T_3 were 9.21 kg, 7.25 kg and 7.91 kg.

7.3.5 Contrary to cow manure, the addition of aqueous urea solution (1.5% and 3%) seems to give beneficial effect in terms of mushroom yield. Further experiments are required to confirm and determine the optimum level of urea for maximum mushroom yield.

SCIENTIFIC OFFICER : G. PALLANY

7.4 *Tobacco (Nicotiana tabacum L.)*

7.4.1 The five experiments namely flue-cured variety trial, planting date experiment, Nitrogen and Potash fertilizer trials and the Chemical Control of Suckers experiment planted out in the second tobacco season of 1977 were all successfully completed and results analysed statistically. The same set of experiments was laid out for the last time in both seasons of 1978. Data for the first season crop have already been compiled, while the second season crop is still in progress. All experiments were performed at Richelieu Experiment Station, where the soil a reddish silty clay belongs to the Richelieu family of lowhumic latosols.

7.4.2 *Variety trials*

7.4.2.1 Nine varieties underwent experimentation in 1977 namely the two commercially grown varieties N.C. 95 and S.C. 66, the new introductions S.C. 71, S.C. 72, Speight G28, Speight G33, Coker 347 and SCR and the old variety Yellow Mammoth. Because of its low yielding potential coupled with its high susceptibility to the most common tobacco diseases, Yellow Mammoth was replaced in the 1978 trial by a new variety introduced from the U.S.A., namely Coker 86. The nine varieties were tested in a randomized complete block design with four replicates.

7.4.2.2 The 1977 trial confirmed the relatively high yielding characteristics of N.C. 95 (10,341 kg/ha of fresh and 1,754 kg/ha of cured leaves). The lowest yield was obtained with Yellow Mammoth (6,071 kg/ha of fresh and 1,089 kg/ha of cured leaves respectively). These figures were significantly lower at the 5% level than those of N.C. 95. N.C. 95 further proved itself to be the most resistant variety to nematode infestation. The degree of attack observed within the most susceptible varieties SCR and Speight G33 differs significantly at the 5% level from that of the others.

7.4.2.3 Results for the 1978 trial showed that N.C.95 remained the best variety for the moment, achieving fresh and cured leaf yields of 15,297 kg/ha and 1,763 kg/ha respectively. Statistical analysis applied to fresh leaf data indicates that N.C.95 differs at the 5% significance level from all varieties except SCR (13,660 kg/ha) and Speight G28 (13,315 kg/ha), but differs only from Speight G33 (1,448 kg/ha) and S.C.72 (1,442 kg/ha) in so far as cured leaf figures are concerned.

7.4.2.4 Qualitywise, SCR proved to be the best. Its leaves were sold at a mean price of Rs 10.27 per kg and this price was significantly different at the 5% level from all the others. In this trial, N.C. 95 happened to be the variety with leaves of the poorest grades (Rs 5.50 per kg), the figure being significantly less at the 5% level than that of S.C. 71 (Rs 7.41/kg) and SCR (Rs 10.27/kg) only.

7.4.2.5 The highest gross returns of Rs 15,800 per hectare were derived from SCR, and a significant difference at the 5% level existed between that sum and the financial returns obtained from the others. These, however, did not differ significantly at the 5% level among them. The lowest revenue was obtained with Coker 347 (Rs 8,991 per hectare).

7.4.3 *Nitrogen fertilizer trial*

7.4.3.1 The treatments tested in a 5×5 latin square design were $N_0=0$ kg N/ha, $N_1=15$ kg N/ha, $N_2=30$ kg N/ha, $N_3=45$ kg N/ha and $N_4=60$ kg N/ha and were provided in the form of sulphate of ammonia. The phosphorus and potassium components were supplied in the form of triple superphosphate and of sulphate of potash at the respective rates of 100 kg P_2O_5 and 100 kg K_2O per hectare. Fertilizers were applied over and above the level in the soil which was as shown below. The figures quoted (Table 7.3) are the means of five samples taken from the planting surface.

TABLE 7.3

SOIL ANALYSIS DATA						
		pH	% N	ppm P	k. meq/ 100 g soil	% D.M.
2nd Season 1977	...	6.06	0.21	42	1.07	4.1
1st Season 1978	...	5.9	0.20	60	1.32	4.2

As expected, N_0 yielded the lowest figure for yield (12,079 kg/ha of fresh and 1,912 kg/ha of cured leaves) for the 1977 crop. The highest yield figures were reached with N_2 (15,707 kg/ha of fresh and 2,335 kg/ha of cured leaves). In all cases, however, the treatments did not seem to differ significantly at the 5% level.

7.4.3.2 The same trend appeared for the 1978 trial the lowest yields achieved with N_0 (9,899 kg/ha of fresh and 1,982 kg/ha of cured leaves) and the highest with N_2 (12,217 kg/ha of fresh leaves) and with no significant difference at the 5% level among the green leaf data of the different treatments. However, N_4 the highest cured leaf yield (1,383 kg/ha) seemed to differ at the 5% significance level from N_1 (1,112 kg/ha) and N_6 (1,082 kg/ha).

7.4.3.3 With an average leaf quality of Rs 10.15 per kg, N_2 was the best treatment but was not significantly different at the 5% level from the other treatments. N_4 produced leaves of the lowest grades (Rs 7.88 per kg).

7.4.3.4 Further leaves from N_2 brought in the highest revenue of (Rs.13.949 per hectare and N_1 the lowest i.e Rs 10.053 per hectare. In this case also no statistical difference at the 5% level existed between the treatments.

7.4.4 Potash fertilizer trial

7.4.4.1 Five levels of potash were compared in a 5×5 latin square design namely $K_0=0$ kg K_2O /ha, $K_1=60$ kg K_2O /ha, $K_2=120$ kg K_2O /ha, $K_3=180$ kg K_2O /ha and $K_4=240$ kg K_2O /ha and were provided in the form of sulphate of potash. The Nitrogen and phosphorus fertilizer components were supplied in the form of sulphate of ammonia and of triple super-phosphate at the rate of 40 kg N/ha and 100 kg P_2O_5 per hectare respectively. A soil analysis was conducted and the mean figures tabulated below (Table 7.4.).

TABLE 7.4

SOIL ANALYSIS DATA						
		pH	% N	ppm P	k. meq/ 100 g soil	% D.M.
2nd Season 1977	...	5.9	0.19	30	1.13	4.52
1st Season 1978	...	6.1	0.21	58	1.32	4.20

For the 1977 trial, K_1 proved to be the best treatment regarding fresh leaf yield (16,190 kg/ha). The lowest yield of 10,973 kg/ha was obtained with K_3 . Statistical analysis shows that K_1 differs significantly at the 5% level from K_0 (12,098 kg/ha) and K_3 (10,973 kg/ha).

7.4.4.2 Analysis of cured leaf data, however, showed that all treatments outyielded the control K_0 treatment (1,273 kg/ha) at the 5% significance level, but did not differ significantly at the 5% level among them. Treatment K_4 gave the highest figure for cured leaf yield (1,935 kg/ha).

7.4.4.3 In the 1978 trial, K_1 came up with the highest green leaf yield of 10,612 kg/ha. No significant difference at the 5% level was noted between it and K_3 (10,308 kg/ha), K_0 (10,308 kg/ha) and K_4 10,307 kg/ha). All these treatments were further found to outyield K_2 (9,899 kg/ha) at the 5% significance level.

7.4.4.4 The cured leaf data were somewhat surprising with the highest yield being achieved with K_0 (1,408 kg/ha) and the lowest with K_4 (1,180 kg/ha), still no significant difference at the 5% level between treatments was noted.

7.4.4.5 It seems that high doses of potassium (K_4) have a depressing effect on the selling quality of the leaves in this trial. In fact leaves coming from K_4 fetch an average price of Rs 6.26/kg only and was significantly lower at the 5% level than the prices obtained for leaves coming from the other treatments. The best quality leaves (colour and size) came from K_0 (Rs 8.21/kg). The same observation was noted with the calculated gross returns of leaves coming from the different treatments. K_0 treatment brought in gross revenues of Rs 12,080 per hectare whereas leaves planted on a potassium rich soil (K_4) gave only Rs 7,443 per hectare. A significant difference at the 5% level was found between K_0 and K_3 , K_4 .

7.4.5 *Planting date trial*

7.4.5.1 The objective of the experiment being to determine the optimum date of sowing and hence transplanting of the tobacco crop, five different planting dates were compared. The treatments were spaced at 15 days intervals and were as follows:—

<i>2nd season 1977</i>		<i>1st season 1978</i>
P_1 = Transplanting beginning August	...	Mid-February
P_2 = Transplanting mid-August	...	Beginning March
P_3 = Transplanting beginning September	...	Mid-March
P_4 = Transplanting mid-September	...	Beginning April
P_5 = Transplanting beginning October	...	Mid-April

The treatments were tested in a randomized complete block design with four replicates.

7.4.5.2 For the 1977 crop, however, treatment P_1 could not be planted in time because of bad weather conditions. Treatment P_2 , found to be the best in preceding trials, was thus duplicated. P_2 remained the best treatment with yields of 15,048 kg/ha of fresh and 1,910 kg/ha of cured leaves respectively and outyielded all treatments at the 5% significance level in terms of fresh leaf yield. P_1 did not perform well achieving yields of 7,253 kg/ha of fresh and 0,854 kg/ha of cured leaves only and was found to be significantly inferior at the 1% level to the other treatments.

7.4.5.3 The cured leaf yield of P_2 did not differ from that of P_3 (1,379 kg/ha) at the 5% level.

7.4.5.4 Results for the 1978 crop showed that planting at the beginning of March (P_1) was the best (12,937 kg/ha of fresh leaves). But no significant difference existed between the three early planting dates. Late planting (P_4) did not perform well giving only (4,651 kg/ha of green leaves) and was even significantly lower at the 5% level than the other treatments.

7.4.5.5 The cured leaf data more or less confirmed the above findings. Planting at P_1 yielded 1,611 kg/ha but was not significantly different at the 5% level than planting at P_2 (1,512 kg/ha) at P_3 (1,234 kg/ha), and at P_4 (1,095 kg/ha).

7.4.5.6 No difference at the 5% level of significance existed between the quality of the leaves harvested from all treatments. Still the best grades (Rs 6.02/kg) came from P_1 and the poorest (Rs 4.25/kg) from P_4 .

7.4.5.7 P_2 achieves the highest gross returns (Rs 8.837 kg/ha). This value differs at the 5% significance level from the Rs 3.672/ha obtained from P_4 .

7.4.6. *Chemical Control of suckers experiment*

7.4.6.1 Four de-suckering contact and systemic agents were tried in this experiment and their effects on sucker growth and yields analysed and compared to the normal hand suckering treatment. The treatments were (a) Systemic chemical Royal MH (b) Systemic Chemical MH30 (c) Contact chemical off-shoot T-85 (d) Contact Chemical Royaltac followed by MH 30 (e) Off-shoot T-85 followed by royal MH and (f) Control hand suckering.

7.4.6.2 The best Control of sucker growth was obtained with plots treated with a contact chemical followed by a systemic one. The inhibition of sucker growth seems to have a boosting effect on the yields of leaves.

7.4.6.3 In the 1977 trial, plots treated with off-shot T-85 followed by Royal M.H gave the best yields (14 080 kg/ha of fresh and 1,981 kg/ha of cured leaves). The lowest yield came from the hand-desuckered plots (9,108 kg of fresh and 1,590 kg of cured leaves respectively). However, in all cases, the treatments did not have any significant difference at the 5% level on the yields.

7.4.6.4 In the trial conducted in the first season of 1978, the M.H. 30 treatment was eliminated and replaced by a no-desuckering treatment—the M.H. 30 having practically the same effect as the Royal M.H. Sucker control

was best achieved with plots treated with a contact followed by a systemic chemical. The best yield of fresh leaves was obtained from plots that were treated with Royaltac followed by Royal M.H. (11,281 kg/ha), but it differs significantly at the 1% level from the no-desuckering treatment (8,654 kg/ha).

7.4.6.5 However plots that were de-suckered manually gave the highest yield of cured leaves (1,662 kg/ha) and was even significantly different at the 5% level from all treatments except the plots treated with Royal M.H. (1,319 kg/ha). The use of chemicals did not seem to affect adversely the quality of tobacco leaves. On the contrary, the best quality leaves (Rs 12.30/kg) came from plots that were treated with off-shoot T-85 followed by Royal M.H., and this price differs at the 5% significance level from that of the other treatments. The poorest grades were obtained from plots that were not de-suckered (Rs 6.10/kg) and this value was significantly less at the 5% level than that of all other treatments.

7.4.6.6 The highest gross returns were derived from sale of leaves coming from plots that were treated with off-shoot T-85 followed by Royal M.H. (Rs 17,253/ha) and from those treated with Royaltac followed by Royal M.H. (Rs 16,498 kg/ha). Statistical analysis further shows that a significant difference existed between these two values and the others ($P < 0.05$).

SCIENTIFIC OFFICER — J. M. HEERASING

7.5 Garlic (*Allium sativum* L.)

7.5.1 (a) Fertilizer trial

A trial was planted in a randomized block design with five replicates at Plaisance Experiment Station to determine the optimum level of nitrogen application to maximize the yield of bulbs of garlic var. Rodrigues. The treatments were four levels of nitrogen viz:

- (i) 25 kg N ha⁻¹ (N_1)
- (ii) 50 kg N ha⁻¹ (N_2)
- (iii) 75 kg N ha⁻¹ (N_3)
- and (iv) 100 kg N ha⁻¹ (N_4)

The results are shown in Table 7.5

TABLE 7.5
YIELD OF GARLIC (PLAISANCE EXPERIMENT STATION, 1978)

Treatment		Mean Yield — ¹ (kg ha ⁻¹ bed)
25 kg N ha ⁻¹ (N_1)	...	3524.2
50 kg N ha ⁻¹ (N_2)	...	4010.6
75 kg N ha ⁻¹ (N_3)	...	3926.6
100 kg N ha ⁻¹ (N_4)	...	3620.2
S.E. of a mean $\pm$	...	258.5

It was observed that the yield of garlic increased to a maximum of four tonnes at 50 kg N ha⁻¹ (N₂) and decreased at the higher levels of nitrogen application (N₃ and N₄). No significant difference occurred among the treatments.

The yields of garlic obtained were low and the bulb-size of poor quality because of the excessive drought conditions which prevailed during the crop-cycle. The plants dried up prematurely and were harvested two weeks before scheduled.

7.5.2 (b) Planting Date trial

A trial was conducted in a randomised block design with four replicates at Plaisance Experiment Station to determine the optimum time of planting of garlic variety Feng Shan Selection No. 1. The planting dates chosen were end-March, mid-April, end-April, mid-May and end-May 1978. The trial failed and had to be discontinued because the trial site was too acidic for garlic cultivation.

7.5.3 (c) Spacing trial

A trial was conducted in a randomised block design with five replicates at Central Experiment Station, Reduit, to determine the optimum inter-row spacing in the cultivation of garlic variety Rodrigues. The spacings adopted were:

- (i) 7.5 × 7.5 cm (S₁)
- (ii) 7.5 × 15.0 cm (S₂)
- (iii) 7.5 × 22.5 cm (S₃)
- and (iv) 7.5 × 30.0 cm (S₄)

The yield and quantity of garlic are shown in table 7.6

TABLE 7.6

YIELD AND BULB-SIZE OF GARLIC (CENTRAL E.S. 1978)

Treatment		Mean Yield (kg ha ⁻¹ bed)	Bulb-size (% grade B)*
7.5 × 7.5 cm (S ₁)	...	6,538.2	27.50
7.5 × 15.0 cm (S ₂)	...	6,866.8	41.25
7.5 × 22.5 cm (S ₃)	...	7,259.0	55.70
7.5 × 30.0 cm (S ₄)	...	7,080.8	69.63
S.E of a mean ±	...	1,752.9	

The figures indicate that the yield of garlic increased with increasing spacing i.e. decreasing plant density, up to S₃ (7.5 × 22.5 cm) and beyond this density it started to decrease. However, the differences obtained were not significantly different at 5%.

* bulb diameter 2.5 to 5.0 cm.

The yield (Y) may be related to spacing (x) by the following equation:

$$Y = 5 (821.6 + 47.1 x - 0.984 x^2)$$

This implies that the optimal spacing is around 24 cm. Very highly significant quality differences were noted among the treatments. The significant improvement in bulb quality which was brought about by increasing spacing may be described by the equation:

$$Y = 23.35 + 1.107 X$$

where } $Y = \% \text{ of grade B bulbs (diameter 2.5—5.0 cm) on a transformed scale (arcsin } \sqrt{\text{---}} \text{)}$

and $X = \text{interrow spacing in cm}$

7.5.4 (d) Variety trial

A trial was laid out in a randomised block design with five replicates at Central Experiment Station, Reduit, to assess the yield potential and bulb quality of five varieties of garlic. The varieties were:

- (i) Feng Shan Selection No. 1
- (ii) Feng Shan Selection No. 2
- (iii) Pooning
- (iv) Local Rodrigues, and
- (v) A South African var. obtained from the Marketing Board.

The latter variety was very severely attacked by an unknown pest and the matter was investigated into by the Entomology Plant Pathology Divisions. The results of the trial are shown in table 7.7.

TABLE 7.7

YIELD AND BULB SIZE OF GARLIC (CENTRAL ES, 1978)

Variety	Mean Yield kg ha ⁻¹ bed	Bulb size (% grade B)	Confidence intervals for bulb size (5%)
Feng Shan Selection No. 1 ...	6480.6	42.9	36.6—49.2%
Feng Shan Selection No. 2 ...	5771.6	43.4	37.2—49.7%
Pooning ...	8001.2	61.6	55.3—67.6%
Local Rodrigues ...	8094.0	46.2	39.9—52.6%
South African ...	1979.4	—	—

SE of a mean $\pm$... 760.0

It was observed that the significant difference which occurred among the varieties related mainly to a comparison of the South African variety with the others, among which yields varied appreciably but not enough to reach statistical significance at 5% level. The decision taken during the year to release variety Feng Shan Selection No. 1 was based on data collected from previous experiments.

* bulb diameter 2.5 to 5.0 cm.

In terms of bulb quality variety Pooning yielded on average 60% of grade B bulbs (diameter 2.5 to 5.0 cm) and is significantly better than Feng Shan Selections No. 1 and No. 2 and Local Rodrigues, all of which yielded on average 42-45% grade B bulbs. It is worthwhile to mention the performance of variety Pooning in 1978, which indicates substantial improvements since it was introduced three years ago. Its performance will be investigated again in 1979 with a view to its eventual release.

7.6 *Ginger (Zingiber Officinale Roscoe)*

7.6.1 Two trials were laid out in September and November at Plaisance Experiment Station to study the effects of mulching and the combined effects of phosphate and potash fertilizers on the yield of ginger rhizomes. Owing to the excessively dry conditions which have prevailed and the unavailability of watering/irrigation facilities at Plaisance Experiment Station germination and subsequent growth have been slow in both trials. They may have to be discontinued if they fail to recover and progress satisfactorily after the summer rains.

7.7 *Manioc—Cassava (Manihot esculenta)*

7.7.1 An observational trial on lines imported from the International Institute of Tropical Agriculture (IITA), Nigeria, is in progress at Central Experiment Station since March. It is scheduled to be harvested at the end of January 79.

7.8 *Onion (Allium cepa L.)*

7.8.1 (a) *Fertilizer trial*

The combined effects of three different levels of potash and four different levels of nitrogen, applied in the form of sulphate of potash and sulphate of ammonia respectively, on the yield and quality of the Local Red onion were studied in a factorial experiment at Plaisance Experiment Station over the period April-August. The trial was laid down in a randomized block design with four replicates. The treatments were a factorial combination of the following:

- (i) 3 levels of potash (K) viz: 0 (K_0), 75 (K_1) and 150 (K_2) kg/ha of sulphate of potash, and
- (ii) 4 levels of nitrogen (N) viz: 0 (N_0), 75 (N_1), 150 (N_2) and 300 (N_3) kg N/ha in the form of sulphate of ammonia.

The results are presented in table 7.8 below.

TABLE 7.8

YIELD AND QUALITY OF ONION BULBS VAR. LOCAL
(Plaisance Experiment Station, 1978)

Treatment	Mean Yield (t ha ⁻¹ bed)	Bulb Quality (% of Grade B bulbs)*
K ₀ N ₀ ...	10.55	47.88
K ₀ N ₁ ...	16.72	25.80
K ₀ N ₂ ...	19.61	17.30
K ₀ N ₃ ...	23.83	8.79
K ₁ N ₀ ...	12.47	29.60
K ₁ N ₁ ...	18.54	17.06
K ₁ N ₂ ...	21.09	15.67
K ₁ N ₃ ...	18.67	13.28
K ₂ N ₀ ...	11.04	51.61
K ₂ N ₁ ...	15.29	17.83
K ₂ N ₂ ...	17.50	14.80
K ₂ N ₃ ...	17.08	10.11
SE of a mean ± ...	1.855	

The results of the trial indicate that the Local Red onion:

- (i) did not respond significantly to potash fertilizers. In fact the yield remained more or less constant at K₀ (0 kg/ha of K₂S₀) and K₁ (75 kg/ha of K₂S₀) and decreased at K₂ (150 kg/ha of K₂S₀);
- (ii) showed highly significant response to nitrogen at all levels of potash. At K₀ the yield increased linearly from N₀ (0 kg N/ha) to N₃ (300 kg N/ha) whereas at K₁ and K₂ the yield which was initially higher than at K₀, increased up to N₂ (150 kg N/ha) and thereafter decreased for K₁ and remained constant for K₂. There were no significant interactions between nitrogen and potash at the levels tested.

The quality of bulbs was found to decrease with N increments at all levels of potash and the effects of N were stronger at low than at high levels. Potash had no appreciable effect on quality.

7.8.1 (b) Seed production

The unavailability of the local onion seed is believed to be a constraint limiting onion production in Mauritius. Two observational trials were therefore set up at Plaisance Experiment Station and Richelieu Experiment Station to study the aspects of seed production with the ultimate view of satisfying the local demand for seed. The dry seed yields recorded are presented in table 7.9.

* bulb diameter 2.5 to 5.0 cm

TABLE 7.9

DRY SEED YIELD OF ONION, VAR. LOCAL RED
(Plaisance ES and Richelieu ES, 1978)

<i>Site</i>	<i>Yield (Kg ha⁻¹ bed)</i>	<i>Average seed yield per flower head (g)</i>
Plaisance ES ...	709.4	2.6
Richelieu ES ...	1620.0	2.0

At both sites plant growth, flowering and fruit set were satisfactory. At Richelieu Experiment Station higher seed yields were obtained because the trial was irrigated.

7.8.1 (c) Variety trial

A trial was conducted over the period June—November in a randomized design with four replicates at Plaisance Experiment Station to compare the yields and bulb quality of four varieties of onion. The varieties were:

- (i) Texas Early Grano 502 PRR (from Royal Sluis, Holland);
- (ii) Yellow Granex;
- (iii) Pusa Red (from India); and
- (iv) Local Red.

The results obtained are shown in table 7.10. Analysis of results show that the yield and bulb quality of the varieties Texas Earl Grano, Pusa Red and Yellow Granex obtained in unfavourably dry conditions, did not differ significantly among themselves. However the yield and bulb quality of the Local Red variety was significantly inferior in comparison with them; this can be attributed to late planting, as previous findings have shown, the Local Red variety yields best when sown in the first fortnight of March.

TABLE 7.10

YIELD AND BULB QUALITY OF 4 VARIETIES OF ONION
(Plaisance Experiment Station, 1978)

<i>Variety</i>	<i>Mean Yield kg ha⁻¹ bed</i>	<i>Bulb size (% Grade of bulbs)*</i>
Texas Early Grano ...	22,333	54.8
Yellow Granex ...	20,825	46.4
Pusa Red ...	18,672	51.7
Local Red ...	8,541	—
SE of a mean ± ...	2,638	

7.9 Assessment of the foliar spray and soil additive 'Bio-Cat'

A test conducted at Central Experiment Station from October to December showed that the foliar spray and soil additive 'Bio-cat' improved markedly the fruit number and fruit yield of squash, variety Local. The results of the test are shown in table 7.11.

*Bulb diameter = 5 cm.

TABLE 7.11

EFFECT OF 'BIO-CAT' ON THE FRUIT NUMBER AND FRUIT YIELD
OF SQUASH VAR. LOCAL

(Centre ES, 1978)

		Bio-Cat treated	Control	Increase % Control
Fruit number ha ¹ ...	...	96,667	71,667	35
Fruit weight ha ¹ (kg) ...	...	19,275	9,617	100

The test will be repeated on squash, tomato and local pomme d'amour in 1979 for further assessment of the chemical.

7.10 *Observational trial on Sponge gourd (pipengaille) and bitter gourd (margoze) var. CATT*

In a test performed at Richelieu Experiment Station from April—July on sponge gourd (pipengaille) and bitter gourd (margoze) var. CATT plants grown on trellis were shown to perform better than those grown by the conventional trailing method. Results are summarized in table 7.12 below.

TABLE 7.12

PERFORMANCES OF SPONGE AND BITTER GOURDS

(Richelieu ES, 1978)

	Sponge gourd (pipengaille)			Bitter gourd (margoze)		
	A*	B*	C*	A*	B*	C*
Fruit number ha ¹ ...	41,820	20,987	99%	39,660	22,993	72%
Fruit weight ha ¹ (kg) ...	13,867	5,916	134%	5,441	3,171	72%
Average fruit Length (cm)	50	45	11%	18.5	16	16%

* A = plants grown on trellis

B = plants left trailing (control)

C = $(A - \frac{B \times 100}{B})$

SCIENTIFIC OFFICER: K. F. LAN CHOW WING

7.11 *OKRA (Abelmoschus esculentus)*7.11.1 *Variety Trial*

A second trial was completed at Pamplémousses Experiment Station, harvest of which started in January and lasted till May 1978. A randomised block design with four replicates was used.

The main results are as follows:—

TABLE 7.13

YIELD OF OKRA FRUITS (M. TONS/HA), MEAN PLANT HEIGHT (CM)
AND FRUIT SPININESS

<i>Variety</i>	<i>Fruit Yield in tons/ha</i>	<i>Plant Height after one month of harvest (cm)</i>	<i>Fruit</i>
Perkin's Spineless ...	5.07 ^{b*}	100 ^a	Spineless
Clemson's Spineless ...	13.66 ^a	104 ^a	Spineless
Local Barkly ...	7.11 ^a	158 ^b	Slightly spiny
Local Piton ...	13.84 ^a	104 ^a	Spineless
Dwarf Green ...	11.15 ^a	102 ^a	Spiny

The plants suffered from nematode infestation and variety Perkins' Spineless appeared to be the most susceptible. Varieties Local Piton and Clemson's Spineless seemed more promising than Local Barkly, since they were relatively dwarf and their pods were spineless.

7.12 Hot Pepper (*Capsicum annum* L.)

7.12.1 Spacing Trial

The trial, using seedlings of variety Local Cipaye, was conducted at Pamplémousses Experiment Station from April to September 1978. Layout was a 2×3 factorial with five replicates.

Treatments were as follows :

- A. Row Spacing: $I_1 = 60$ cm between rows
 $I_2 = 60$ and 90 cm alternately between rows
- B. In-row spacings: $S_1 = 30$ cm
 $S_2 = 45$ cm
 $S_3 = 60$ cm

Yields are tabulated below :

TABLE 7.14

MEAN YIELD OF HOT PEPPER (M. TONS/HA)

		S^1	S^2	S^3	<i>Mean I</i>
I_1	...	4.55 ^{a*}	3.59 ^b	4.01 ^{ab}	4.05
I_2	...	4.20 ^{ab}	3.86 ^{ab}	3.30 ^c	3.79
Means S	...	4.37	3.72	3.65	

There was no significant difference between the two row spacings I_1 and I_2 . However the smallest in-row spacing S_1 gave significantly higher yields at both I_1 and I_2 .

* In each column treatments with letters in common do not indicate significance at 5% level

† Treatments with letters in common do not differ significantly at 5% level.

7.13 Radish (*Raphanus sativus* L.)

7.13.1 Observational Trial (Pamplemousses Experiment Station)

Seeds of the variety Novired obtained from Royal Sluis, were sown in August 1978 and compared to variety Local in twice replicated beds each of size 4.0 by 1.0 metre. The spacing adopted was 20 cm by 5 cm. Fertilizers were applied just before sowing, at the following rates per hectare of bed area: 375 kg Triple Superphosphate, 500 kg Muriate of Potash, 500 kg Sulphate of Ammonia. Another 500 kg of Sulphate of Ammonia was added ten days after seed germination. The main results are shown in the table below:

TABLE 7.15

YIELD OF RADISH (M. TONS/HA OF BED AREA), AND ROOT : TOP RATIO					
Variety		Total yield	Root yield	Ratio root	: top by weight
Local	...	53.9	23.2	0.76	: 1
Novired	...	31.7	23.2	2.73	: 1

Both varieties produced the same root yield. Novired however would appear to be superior since it had much less foliage than the local variety. Further trials with additional imported varieties will be programmed for the following year.

7.14 Pomme d'Amour (*Lycopersicon esculentum* Mill)

7.14.1 (a) Plant population and spacing trials

Two trials were conducted at Richelieu Experiment Station, one in Winter and the other in Summer of 1978. A 2×4 factorial layout with four replicates was used. Treatments consisted of the following:—

- A. Spacing : $S_1 = 90 \times 60$ cm (modified to 100×60 cm in the Summer trial)
 $S_2 = 150 \times 60$ cm
- B. Plant population : $P_1 =$ one plant per hole
 $P_2 =$ two plants per hole
 $P_3 =$ three plants per hole
 $P_4 =$ four plants per hole

Results are tabulated below:—

TABLE 7.16

YIELD OF POMME D'AMOUR (M. TONS/HA) WINTER						
		P_1	P_2	P_3	P_4	<i>Mean S</i>
S_1	...	14.73 ^{a*}	12.29 ^{ab}	11.19 ^{ab}	9.11 ^b	11.83
S_2	...	13.93 ^a	14.49 ^a	12.29 ^{ab}	11.62 ^{ab}	13.08
Mean P	...	14.33	13.39	11.74	10.37	

* Figures with letters in common do not indicate significance at 5% level.

TABLE 7.17

YIELD OF POMME D'AMOUR (M. TONS/HA) SUMMER

		P ₁	P ₂	P ₃	P ₄	Mean S
S ₁	...	6.95 ^{b*}	8.26 ^{ab}	8.16 ^{ab}	10.38 ^a	8.44
S ₂	...	7.90 ^{ab}	8.70 ^{ab}	9.02 ^{ab}	10.19 ^a	8.95
Mean P	...	7.43	8.48	8.59	10.28	

In both trials, the two spacings S₁ and S₂ showed no significant difference between them, but significant difference were detected among the plant population treatments.

In the Winter trial, the yield showed a tendency to decrease with increasing number of plants per hole, whereas the reverse was evident for the Summer trial. Significant differences were attained only between the lowest and the higher yields in both seasons.

Further trials will be made in 1979.

7.14.2 (b) *Response of pomme d'amour to different cultural treatments*

The trial, first conducted at Pamplémousses Experiment Station in 1977, was repeated at Richelieu Experiment Station during the Winter months. Variety Moneymaker was used, transplanted in a 2³ factorial layout with four replicates. Treatments were as follows:

1. Spacing ... P₁ = 90 × 45 cm
P₂ = 90 × 30 cm
2. Staking ... S₁ = Plants staked with bamboo
S₂ = No staking
3. Pruning ... B₁ = Plants pruned to single stem
B₂ = No pruning

Plot size was 4.5 by 4.5 metres.

The main results are shown below:

TABLE 7.18

FRUIT YIELD OF POMME D'AMOUR IN (M. TONS/HA)

		P ₁ = 90 × 45 cm spacing		P ₂ = 90 × 30 cm		Mean S
		B ₁ (pruning)	B ₂ (no-pruning)	B ₁	B ₂	
Staking S ₁	...	22.5 ^{bc*}	28.6 ^{ab}	28.3 ^{ab}	30.7 ^a	27.5
No staking S ₂	...	17.9 ^c	21.3 ^c	20.9 ^c	22.8 ^{bc}	20.7
Mean B	...	20.2	24.9	24.6	26.7	
Mean P	...	22.6		25.7		

*Mean with letters in common do not differ significantly at 5% level

TABLE 7.19

MEAN FRUIT SIZE OF POMME D'AMOUR						
		$P_1=90 \times 45cm$		$P_2=90 \times 30cm$		
		B_1	B_2	B_1	B_2	Mean S
		(pruning)	(no pruning)			
S_1		78 ^{a*}	58 ^c	71 ^b	56 ^c	66
S_2		76 ^{ab}	61 ^c	70 ^b	58 ^c	66.5
Mean B		77	59.5	70.5	57	
Mean P			68		64	

Yield was significantly increased by staking. Leaving the plants unpruned (not removing any side shoot) and planting at the closer spacing also tended to increased yield. Staking had no effect on fruit size while reducing the spacing tended to decrease it. Fruit size was significantly increased by pruning.

7.15 Carrot (*Daucus carota*)

7.15.1 Variety Trials

Two trials were conducted during the Winter months, one at Pamplémousses Experiment Station and the other at Barkly Experiment Station. Bed size was 1.2 metres by 10.0 metres and spacing 30 cm by 5 cm giving four rows per bed. A randomised split plot design was used with five replicates. The roots were harvested on four occasions namely 72, 78, 84 and 91 days respectively from sowing.

The main results are set out below:—

TABLE 7.20

ROOT YIELD (M. TONS/HA OF BED AREA) Pamplémousses Experiment Station

Varieties	Days from sowing			
	72 days	78 days	84 days	91 days
1. Chantenay Red Cored ...	13.76 ^{a*}	21.70 ^a	24.63 ^a	30.99 ^a
2. Chantenay Royal ...	14.41 ^a	21.35 ^a	25.74 ^a	29.91 ^a
3. Goldinhardt ...	14.12 ^a	21.07 ^a	24.74 ^a	30.90 ^a
4. Nantes ...	13.71 ^a	21.33 ^a	25.28 ^a	25.40 ^b
5. Red Seasons ...	15.05 ^a	19.51 ^a	24.52 ^a	30.88 ^a
6. Market King ...	14.63 ^a	19.57 ^a	23.04 ^a	33.03 ^a
7. Western Queen ...	15.50 ^a	20.66 ^a	25.25 ^a	32.13 ^a

S.E. $\pm$ 1.25

There was a two-fold increase of root yield from 72 days to 91 days, although at each harvest period no significant difference was generally detected among the varieties. Nantes was found to be susceptible to blight, which may have accounted for its lower yield at 91 days.

Roots with desirable characteristics were chosen from each variety and were transplanted to an adjacent field. It was found that only varieties Western Queen and Market King succeeded to flower and produce seeds.

*Means with letters in common are not significantly different at 5% level

†In each column, means, followed by the same letter are not significantly different at 5% level.

TABLE 7.21

ROOT YIELD (M. TONS/HA OF BED AREA)

Barkly Experiment Station

<i>Varieties</i>		<i>Days from sowing</i>			
		<i>72 days</i>	<i>78 days</i>	<i>84 days</i>	<i>91 days</i>
1. Chantenay Red Cored	...	19.10 ^{a*}	27.53 ^{ab}	34.57 ^a	41.67 ^a
2. Chantenay Royal	...	20.28 ^a	29.84 ^a	34.83 ^a	42.98 ^a
3. Goldinhardt	...	18.82 ^a	26.35 ^{ab}	33.78 ^a	42.94 ^a
4. Nantes	...	20.00 ^a	27.92 ^{ab}	32.72 ^a	40.05 ^{ab}
5. Red Season	...	19.54 ^a	22.31 ^c	31.23 ^a	35.32 ^c
6. Market King	...	16.75 ^a	21.60 ^c	25.24 ^b	30.34 ^d
7. Western Queen	...	17.87 ^a	24.94 ^{bc}	32.32 ^a	37.50 ^{bc}

S.E. = ± 1.34

Again root yield increased considerably from 72 to 91 days. Significant yield differences cropped up among some varieties at harvest dates later than 72 days. Variety Market King was found to produce the lowest yield.

7.16 *Lettuce (Lactuca sativa L.)*7.16.1 *Fertilizer trial:*

An NPK fertilizer trial was conducted in winter at Pamplemousses Experiment Station. A $3 \times 2 \times 2$ factorial design with four replicates was used. Bed size was 1.2 metres by 2.4 metres with plant spacing of 20×20 cm, giving six rows each of twelve heads per bed.

Treatments were as follows:—

(a) $N_1 = 0$ kg/ha of sulphate of ammonia

$N_2 = 475$ kg/ha of sulphate of ammonia

$N_3 = 950$ kg/ha of sulphate of ammonia

(b) $P_1 = 120$ kg/ha of Triple Superphosphate

$P_2 = 240$ kg/ha of Triple Superphosphate

(c) $K_1 = 120$ kg/ha of Muriate of potash

$K_2 = 240$ kg/ha of Muriate of potash

All P and K and half of N were applied at transplanting. The remainder of N was added twelve days later.

* In any column, means followed by any letter in common are not significantly different at 5% level.

The main results are tabulated below:—

TABLE 7.22

YIELD OF LETTUCE (M. TONS/HA OF BED AREA)

		P_1		P_2		Mean N
		K_1	K_2	K_1	K_2	
N_1	...	8.09 ^{c*}	8.23 ^c	9.07 ^c	10.21 ^c	8.90
N_2	...	36.43 ^{ab}	32.02 ^b	36.91 ^a	33.22 ^{ab}	34.65
N_8	...	34.15 ^{ab}	34.13 ^{ab}	33.88 ^{ab}	32.28 ^{ab}	33.61
Mean	...	26.22	24.79	26.62	25.24	
Mean	...	25.51		25.93		

S.E. for figures in body of table = ± 1.46

The effect of Nitrogen was highly significant, but there was no difference between N_2 and N_8 levels. Also no significant difference was detected among the P and K levels. There was no interaction among N, P and K.

SCIENTIFIC OFFICER: Y. BOODOO

7.17 Tea: *Camellia sinensis* (L) (O. Kuntze)

7.17.1 Clonal Selection

7.17.2 Chloroform Tests

It was not necessary to perform any chloroform test since the fermenting potential of each mother-bush at Wooton had already been assessed. No new fields are available within the station for selection works.

7.17.3 Rooting Trials

The rooting capacity of four mother-bushes from Field 16-17 was tested against VPIH as control. Forty-five whole leaf single-node cuttings of each mother-bush were planted completely randomised in polythene sleeves in the nursery in November 1977. Table 7.23 shows the results obtained in May 1978:

TABLE 7.23

PERCENTAGE SURVIVAL IN ROOTING TRIAL

Mother-bush	% Survival	Remarks
F 9/24	... 82	Selected
F 9/25	... 82	Selected
F 9/42	... 78	Selected
F 9/56	... 80	Selected
VPIH	... 90	

*Means with letter in common do not differ significantly at 5% level.

7.17.4 Propagation

Mother-bushes F4/273, F4/275, F4/276, F4/278 have been found to perform better than VPIH. Sixty cuttings of each of these mother-bushes have been planted in the nursery to build up a nucleus of planting material for future work.

It was decided that tea-seed garden at Reduit would be closed. Consequently cuttings of Reunion clones CL 110, CL 16, CL 19, were taken from Central Experiment Station to be planted for establishment in the nursery collection at Wooton Tea Experiment Station.

7.17.5 Orthodox Black Tea Mini-manufacture

Thirty-four samples of black tea were sent abroad for evaluation of taste/liquoring characteristics and pricing. Table 7.24 shows samples which were highly priced.

TABLE 7.24

PRICES OF MADE TEA FROM MOTHER-BUSHES

Field	Mother-bush	Date manufacture	Price obtained Rs/Kg black tea	Price VPIH Rs/Kg black tea
2	F1A/555	... 24.2.78	17.00	10.00
2	F1A/568	... 24.2.78	15.00	10.00
5	F4/160	... 12.1.79	15.00	12.50
5	F4/161	... 13.1.78	12.80	10.50
5	F4/77	... 13.1.78	15.50	10.50
13	F6A/95	... 2.3.78	16.00	10.00

7.17.6 Agronomic Experiments

It was decided that foliar and soil analysis would be carried out in all fertiliser experiments. From results of previous experiments, it was found that sampling in the field would be best carried out at least twice a year throughout the pruning cycle, in January and June. It is hoped that determination of macro-and micro-elements will give a better insight into the complex inter-relationship governing tea-bush nutrition, thereby leading to accurate fertiliser recommendations.

7.17.7 Experiment IIIA: To determine the biological and economic optimal rate of nitrogen application at two levels of phosphate and potash

The experiment was laid out in Field I under mature Malayan Jat pruned April 1978. A split-plot design in a Latin Square was used with Nitrogen levels as main treatment and two levels of phosphate and potash as split-plot treatments.

Treatments : 5 main Nitrogen Levels			Split-plot treatments	
T ₁	200 Kg N/ha	...	Low level (PK) ₁	30 Kg P ₂ O ₅ /ha
T ₂	250	...		30 Kg K ₂ O/ha
T ₃	300	...		
T ₄	350	...	High level (PK) ₂	90 Kg P ₂ O ₅ /ha
T ₅	400	...		90 Kg K ₂ O/ha

7.17.8 Experiment IVA: *To determine the uptake of phosphorus by tea-plants applied in the form of triple super-phosphate in presence of different types of mulch*

The experiment has completed the 2nd year of its first three-year cycle.

Treatments: Pruning Litter	...	...	375 kg/plot
T ₂ Bagasse	...	...	375 kg/plot
T ₃ Control	...	...	No mulch
T ₄ Sawdust	...	...	375 kg/plot
T ₅ Tea-Waste	...	...	375 kg/plot

TABLE 7.25

AVERAGE ANNUAL YIELD OF EACH TREATMENT (JULY 77 - JUNE 78)

Treatments			Kg green leaf/ha per year
T ₁	...	...	14,891
T ₂	...	...	13,291
T ₃	...	...	14,020
T ₄	...	...	11,925
T ₅	...	...	13,912

SE of a treatment mean $\pm$ 575

The yields of the treatments did not differ significantly at 5%. However, pruning litter gave the highest yield for two consecutive years; it has a low C/N ratio compared to the other treatments and releases minerals gradually during decay. It seemed to be the best mulch for use in tea plantations.

TABLE 7.26

AVERAGE PHOSPHORUS LEVEL IN SOIL, 1ST LEAF, 3RD LEAF
(JULY 77—JUNE 78)

Sampling dates	Soil P avail ppm	1st leaf P% DM	3rd leaf P% DM
26. 7.77	... 42	0.457	0.316
29. 8.77	... 82	0.457	0.315
30. 9.77	... 33	0.497	0.348
27.10.77	... 56	0.478	0.354
17.11.77	... 92	0.452	0.312
15.12.77	... 121	0.445	0.332
23. 3.78	... 132	0.514	0.380
28. 4.78	... 137	0.498	0.334
29. 5.78	... 79	0.498	0.391
28. 6.78	... 264	0.463	0.316

No chemical analysis was possible during January and February as the Chemistry Laboratory was being moved to another building. Table 7.26 shows that while either leaf phosphorus was more or less constant throughout the year, soil phosphorus showed wide fluctuations. The available soil phosphorus seemed to vary with the prevailing rainfall in the month. The phosphorus levels of 1st leaf and 3rd leaf were highly correlated while soil phosphorus did not show any correlation with the phosphorus level in either leaf.

7.17.9 *Experiment VA: Effect of NPK application in the year of prune followed by application of N only during subsequent years prior to next prune as compared to NPK in the year of prune*

The trial has compleaed its 3-year cycle. It was conducted in Field 16 under Malayan Jat doubly-spaced and consisted of 3 treatments replicated over 7 blocks with 200 bushes per plot. The nitrogen rate was kept constant at 88 kg N/ha (80 lb N/acre).

Treatments are listed below:

	Year 0	Year 1	Year 2
T ₁	NPK 1:2:2	N only	N only
T ₂	NPK 1:2:2	NPK 25:5:5	NPK 25:5:5
T ₃	NPK 25:5:5	NPK 25:5:5	NPK 25:5:5

TABLE 7.27

AVERAGE ANNUAL YIELD OVER THREE YEARS (1975-1978)

Treatments				Kg green leaf/ha per year	
	T ₁	...	...	...	11,400
...	T ₂	...	...	...	10,138
	T ₃	...	...	...	10,121

SE of a treatment mean $\pm$ 447

The total yields of the treatments throughout the pruning cycle were not significantly different at 5% level. It seemed that phosphate-potash application after the pruning year had no marked effect on the yield. Presently a new factorial experiment VB has been laid down in the field to examine this trend.

7.17.10 *Experiment VB: To determine the effect of time and frequency of application of phosphate and potash on the yield of tea, the nitrogen rate remaining constant*

This experiment was laid out in Fields 16-17 under Malayan Jat pruned June 1978. A randomised complete block design with 4 replicates was used.

Each plot consisted of 4 rows $\times$ 50 bushes (200 bushes). Treatments were as shown below; 2 levels of PK combination $(PK)_1$, and $(PK)_2$ have been broadcast:

- (i) in 3 equal split applications throughout pruning cycle (T_1 , T_4)
- (ii) at beginning of cycle (T_2 , T_5)
- (iii) at end of cycle (T_3 , T_6)

	Year 1	Year 2	Year 3
T_1	$\frac{1}{3}(PK)_1$	$\frac{1}{3}(PK)_1$	$\frac{1}{3}(PK)_1$
T_2	$(PK)_1$	—	—
T_3	—	—	$(PK)_1$
T_4	$\frac{1}{3}(PK)_2$	$\frac{1}{3}(PK)_2$	$\frac{1}{3}(PK)_2$
T_5	$(PK)_2$	—	—
T_6	—	—	$(PK)_2$

Where $(PK)_1 = 30 \text{ Kg } P_2O_5/\text{ha} + 30 \text{ Kg } K_2O/\text{ha}$

$(PK)_2 = 90 \text{ Kg } P_2O_5/\text{ha} + 90 \text{ Kg } K_2O/\text{ha}$

Nitrogen is applied at a constant rate of 300 kg N/ha in two splits in September and February.

7.17.11 Experiment VII: To determine the optimum time of prune

The experiment has completed its 3-year cycle. Six treatments were replicated over four blocks in Field 4 under Malayan Jat. Pruning and tipping heights were kept constant in all treatments.

Treatments

T_1	... Prune in March
T_2	... Prune in April
T_3	... Prune in May
T_4	... Prune in June
T_5	... Prune in July
T_6	... Prune in August

TABLE 7.28

AVERAGE ANNUAL YIELD OF TREATMENTS OVER THE PRUNING CYCLE (1975-1978)

Treatments	Kg green leaf/ha per year
T_1 ...	... 15,236
T_2 ...	... 15,542
T_3 ...	... 16,172
T_4 ...	... 15,017
T_5 ...	... 13,892
T_6 ...	... 13,506

SE of a treatment mean $\pm$ 767

The yields of the six treatments during cycle were not significantly different at 5%. However, when the treatments were grouped (T_1 , T_2 , T_3 , v/s T_4 , T_5 , T_6), covariance analysis showed that the yield obtained with early pruning was significant at 5% as compared to that obtained with late pruning. Yield began to decline rapidly when pruning was carried out after May. The same experiment will be repeated for another cycle.

7.17.12 Experiment IX: *Optimum tipping height for tea*

The experiment has completed its 3-year cycle. Four treatments were replicated over four blocks in Field 2 under Local Jat. Pruning heights were kept constant in all treatments.

Treatments

T_1	...	Tipping at 4" above pruning level
T_2	...	Tipping at 5" above pruning level
T_3	...	Tipping at 6" above pruning level
T_4	...	Tipping at 8" above pruning level

TABLE 7.29

AVERAGE ANNUAL YIELD THROUGHOUT PRUNING CYCLE (1975-1978)

<i>Treatments</i>		<i>Kg green leaf/ha per year</i>
T_1	...	15,477
T_2	...	16,037
T_3	...	16,513
T_4	...	17,992

SE of a treatment mean $\pm$ 514

The yields of the treatments throughout the pruning cycle were not significantly different at 5%. However, a regression analysis showed a significant linear increase of 422 kg green leaf/ha per annum for each increment of 1" in tipping height.

7.17.13 Experiment X: *Optimum dose of nitrogen for tea*

The experiment has ended its 3-year cycle. Four treatments (low doses of nitrogen) were replicated over six blocks with 200 bushes per plot.

Treatments

T_1	...	— 80 lb N/arpent
T_2	...	100 lb N/arpent
T_3	...	120 lb N/arpent
T_4	...	140 lb N/arpent

TABLE 7.30

AVERAGE ANNUAL YIELD THROUGHOUT PRUNING CYCLE (1975-1978)

Treatments		Kg green leaf/ha per year	
T ₁	...	...	13,399
T ₂	...	...	13,028
T ₃	...	...	13,653
T ₄	...	...	14,119
SE of a treatment mean $\pm$ 303			

The yields over a period of three years did not differ significantly at 5%. The results showed that no optimum had been reached, there being an increase in the yield with increasing nitrogen doses. Two factorial experiments (expt. IIIA and expt. XI) have been laid out in the field to investigate this fertilisation aspect more deeply.

7.17.14 Experiment XI: *To determine the effect of different rates of Nitrogen application on the yield of tea at different levels of phosphate and potash*

This experiment was laid out separately under two soil types:

(a) Wooton T.E.S.—Latosolic Brown Forest Soil.

(b) Belle-Rive T.D.A.—Humic Ferruginous Latosol

A split-plot design in randomised blocks was used with Nitrogen as main treatment and phosphate-potash combinations as split-plot treatments. (NxPxK—4x2x3). The experiment was replicated over four blocks.

Treatments:		Split-plot treatments	
Main treatments			
N ₁ 100 kg N/ha	...	P ₀ -0	
N ₂ 200 kg N/ha	...	P ₁ -90 kg P ₂ O ₅ /ha	
N ₃ 300 kg N/ha			
N ₄ 400 kg N/ha	...	K ₀ -0	
		K ₁ - 60 kg K ₂ O/ha	
		K ₂ -120 kg K ₂ O/ha	

SCIENTIFIC OFFICER: S. NAIDU

7.18 *Fodder Grasses*

7.18.1 The experiment is to compare the suitability of 8 grass species as a source of fodder. It was set up in January 1974 at Curepipe Experiment Station. The design was of a randomized-block type with 4 replicates, each replicate having 8 plots. The grasses were harvested twice during 1978 i.e. on 27th January 1978 and 1st June 1978. Table 7.31 below shows the yield of Fresh Matter, Dry Matter, Crude Protein and Crude Fibre for six of the 8 treatments; plots of *Cenchrus ciliaris* and *Chloris gayana* have been unproductive during the year.

TABLE 7.31

MEAN YIELD IN TONS/HA/YR.					
Species		Fresh Matter	Dry Matter	Crude Protein	Crude Fibre
<i>Pennisetum purpureum</i>	...	80.6	15.3	1.5	4.9
<i>Panicum maximum</i>	...	71.5	17.3	1.7	5.6
<i>Bracharia brizantha</i>	...	90.2	18.7	1.8	5.7
<i>Bracharia ruziziensis</i>	...	92.2	21.5	1.9	6.9
<i>Tripsacum laxum</i>	...	96.9	18.5	1.8	6.0
<i>Setaria sphaecelata</i>	...	120.2	34.2	1.8	7.9
S.E. of means	...	±3.5	±3.35	±0.41	±1.19

It was further noted that *T. laxum* has been consistently the best yielder for winter harvests during the recent years.

7.17.2 A similar experiment planted at Palmar Livestock Breeding Station in February 1976 was harvested three times during the year viz: 22nd February 1978, 21st July 1978 and 9th November 1978. Yields are shown in Table 7.32 below. Elephant grass (*P. purpureum*) remains clearly the best species for the Palmar region, yielding about twice as much as the other species.

TABLE 7.32

MEAN YIELD IN TONS/HA/YR.						
Species			Fresh Matter	Dry Matter	Crude Protein	Crude Fibre
<i>Pennisetum purpureum</i>	...	...	162.3	35.0	10.1	4.4
<i>Cenchrus ciliaris</i>	...	...	60.9	24.0	8.4	4.2
<i>Chloris gayana</i>	...	...	60.1	21.8	6.4	4.3
<i>Panicum maximum</i>	...	...	79.8	26.9	8.7	4.1
<i>Bracharia brizantha</i>	...	...	72.2	29.2	9.3	3.8
<i>Bracharia ruziziensis</i>	...	...	77.3	30.6	9.7	5.2
<i>Digitaria decumbens</i>	...	...	59.1	20.3	7.4	2.7
<i>Setaria sphaecelata</i>	...	...	86.7	22.2	7.2	3.7
S.E. of means	...	...	±3.3	±3.35	±0.41	±1.2

7.19 Fodder Sugarcane

7.19.1 The experiment consists of 12 treatments, corresponding to January planting (T1) up to December planting (T12), in randomized blocks with 4 replicates at Richelieu Experiment Station. It was started in October 1974 and harvesting was carried out after 12 months of growth. In 1978, it was decided to harvest after only 8 months of growth, in the light of results obtained from the cutting-interval experiment on fodder sugarcane. Thus only one harvest was made, and the data of Table 7.33 relate to the yield and various characteristics of the sugarcane produced.

TABLE 7.33

SUGARCANE PARAMETERS RECORDED

Planting Date		Fresh Yield (tons/ ha.)	Mean Length (cm)	Mean Stalk Diameter (cm)	Mean Stalk/ Whole cane
January	...	55.2	315	3.08	0.79
February	...	51.8	269	2.69	0.79
March	...	56.5	278	2.50	0.72
April	...	41.1	203	2.54	0.66
May	...	62.7	277	3.05	0.81
June	...	48.8	213	2.05	0.77
July	...	49.6	252	2.76	0.73
August	...	76.2	248	2.37	0.76
September	...	50.8	252	2.63	0.72
October	...	58.8	260	2.40	0.88
November	...	60.6	235	2.72	0.80
December	...	56.7	296	2.27	0.82
S.E. of means	...	±4.9	±6.3	±0.24	

7.20 Sweet Potato (*Ipomea batatas*) as fodder.

7.20.1 A variety trial was started on 6.12.78 at Richelieu Experiment Station to evaluate the potential of 6 sweet-potato varieties as a source of fresh animal feed. These varieties are: Kwang Tang, Chain, Leek, Little Leaf, White Starch and Yue Yoon. The design is of the randomized-block type with 5 replicates. Vine cuttings have been planted at a spacing of 0.9m×0.5m in plots measuring 3.6m×10m.

7.20.2 The establishment of vine cuttings has been satisfactory so far. It is proposed to harvest the vines after 8 to 10 weeks of growth, and allow the stand to regenerate from the remaining underground plant parts. Fertilizers will be replaced by cattle-shed effluents.

7.21 *Acacia* (*Leuceana leucocephala* L. (de Wit))

7.21.1 Optimum—spacing trial.

This experiment was designed in five randomized blocks at Richelieu Experiment Station and planted on 29th June 1977 at a seedrate of 100 per metre of row in plots measuring 10.8m×6m.

A first harvest was made on 10th February 1978 and subsequent cuts were carried out at 10 weeks intervals on 24th April 1978, 19th July 1978 and 4th October 1978. The influence of season was quite marked: summer harvests yielded about twice as much as winter harvests. Mean yields for the year are shown in Table 7.34 below.

TABLE 7.34

MEAN YIELDS (TONS/HA/YR) OF ACACIA AT DIFFERENT SPACINGS

<i>Treatment</i> (inter-row spacing)		<i>Mean Yield</i> (Ton/ha/Yr)
90 cm	...	81.5
180 cm	...	69.5
270 cm	...	54.1
360 cm	...	55.3

S.E. of means: ± 2.8

7.21.2 Analysis of total fresh yield for 1978 reveals a highly significant advantage (P 0.001) of the 90 cm spacing; further, the data indicates a linear decrease of yield with increasing spacing up to 270 cm. Yield levels off above 270 cm inter-row spacing.

7.21.3 The trial will be maintained for the next 3 years.

7.22 *Seed-production potential of Acacia var. Peru*

7.22.1 Dry pod were regularly collected from observation plots planted on 10th August 1977 at Richelieu Experiment Station. The uncut rows yielded 3,100 kg seeds/hectare whilst the cut rows gave only 1,992 kg seeds/hectare. However, it should be noted that the uncut rows have now reached about 4 metres in height and will therefore prove difficult at future harvests, so that, despite the 50% advantage in seed-production, the uncut hedges will have to be trimmed.

7.23 *Weed Control*

7.23.1 An experiment was started in February at Richelieu Experiment Station to determine the critical period of weed competition in Tobacco (*Nicotiana tabacum* L.). The plots were arranged in four randomized blocks with eight treatments. These treatments and the corresponding mean yield of green leaves for the first season are shown in Table 7.35.

TABLE 7.35

MEAN YIELD OF GREEN TOBACCO LEAVES (KG/HA)

<i>Treatment</i>	<i>Green Yield (Kg/ha.)</i>
No weeding during crop cycle ...	6,100
Weeding except in first month ...	5,930
Weeding except in first 2 months ...	6,750
Weeding except in first 3 months ...	6,190
Weeding throughout crop cycle ...	12,400
Weeding in first month only ...	11,550
Weeding in first 2 months only ...	12,370
Weeding in first 3 months only ...	11,000
S.E. of mean ...	$\pm 2,050$

7.23.2 Analysis of the data has shown considerable differences between treatments; weeding gives about 100% increases in the yield of fresh leaves. Weeding appears to be essential in the first month of the growth cycle, whereas extra weeding in the second and/or third month/s does not bring about any additional increase in yield to what can be achieved by weeding in the first month only. Further, manual weeding in the late stages of the crop have shown slight detrimental effects on yield.

7.23.3 A similar experiment on onion var. Local Red was conducted at Central Experiment Station as from March 1978. The results are presented in Table 7.36.

TABLE 7.36

YIELD AND GRADE OF ONIONS HARVESTED

<i>Treatment</i>	<i>Yield of bulbs Kg/ha. bed</i>	<i>% Grade B*</i>
T1 Weeding throughout crop cycle ...	14,810	72.3
T2 Weeding except in first month ...	12,480	56.9
T3 Weeding except in first 2 months ...	8,400	37.1
T4 Weeding except in first 3 months ...	8,540	41.3
T5 No weeding ...	7,120	31.8
T6 Weeding in first month only ...	13,920	65.0
T7 Weeding in first 2 months only ...	14,700	71.5
T8 Weeding in first 3 months only ...	13,590	54.2
S.E. of means ...	$\pm 1,180$	

No Grade A bulbs were obtained: only grades Band C were harvested

*Grade B: 2.5—5.0 cm diameter

Grade C: < 2.5 cm diameter

Analysis of variance calculations have shown large differences between the 8 treatments ($P < 0.001$). Weeding practised over the whole of the crop cycle doubles the yield of bulbs compared to "no weeding". It is also evident that a reduced amount of weeding can give rise to yields comparable to clean cultivation, as borne out by the results for T2, T6, T7 and T8, and the indication of T2 as a more economic alternative to clean cultivation is justified. Weeding also increases the proportion of Grade B bulbs and therefore proves beneficial on two counts, viz. yield and quality.

7.23.4 An experiment on similar lines was started in May 1978 at Central Experiment Station with garlic var. Local as the crop. Garlic was grown on 4m × 1.2m beds in randomized blocks with 4 replicates. The results are shown in Table 7.37. Only grades B and C bulbs were obtained.

TABLE 7.37

YIELD AND GRADE OF GARLIC HARVESTED

<i>Treatment</i>	<i>Yield of bulbs Kg/ha. bed</i>	<i>% Grade B*</i>
T1 Weeding throughout crop cycle ...	9,430	46.5
T2 Weeding except in first month ...	7,810	32.6
T3 Weeding except in first 2 months ...	4,560	16.4
T4 Weeding except in first 3 months ...	3,880	23.4
T5 No weeding ...	2,435	9.2
T6 Weeding in first month only ...	7,005	39.2
T7 Weeding in first 2 months only ...	8,410	46.0
T8 Weeding in first 3 months only ...	10,160	49.6
S.E. of mean ...	± 970	

*Grade B: 2.5—5.0cm diameter

Grade C: < 2.5cm diameter

7.23.5 Results show that for garlic crops, the critical period of weed competition extends over the first 3 months of the growth cycle; substantial improvement in yield and quality results from the weeding treatments T1, T6, T7 and T8 in an additive manner. Late weeding is clearly detrimental to yield as shown by the comparison of results for T1 and T8.

7.24 *Biometry*

7.24.1 Data were analysed for Divisional Scientific Officer (Plant Pathology) in connection with a study of inoculation methods, virus strains and age of plant on Tobacco, experimental designs were prepared for Scientific Officers of various divisions, and the data obtained analysed.

SCIENTIFIC OFFICER: S. SEERUTTUN

7.25 *Citrus*: Propagation of disease-free budwood at Palmar Livestock Breeding Station.

7.25.1 The orchards being on an alkaline sandy soil (pH 8.4), some of the plants still showed deficiency symptoms, in spite of heavy and regular manuring.

The following combinations had produced fruits :

Eureka lemon on Rangpur lime stock
 Pineapple orange on Volkameriana stock
 Pineapple orange on Rangpur lime
 Hamlin orange on Volkameriana
 Hamlin orange on Rangpur lime
 Valencia Late Olinda orange on Volkameriana
 Dancy mandarine on Volkameriana
 Fremont mandarine on Sunki tangerine
 Fremont mandarine on Troyer citrange
 Carvahal mandarine on Rangpur lime
 Bearss lime on Volkameriana
 Bearss lime on Rangpur lime

7.25.2 Fruits were thinned to avoid exhaustion of the plants. The weight of some fruits at maturity is given below :

Pineapple orange	...	...	215 — 265 g
Hamlin orange	...	...	200 — 240 g
Valencia orange	...	...	300 — 350 g
Dancy mandarine	...	...	85 — 110 g
Eureka lemon	...	...	175 — 225 g
Bearss lime	...	...	130 — 180 g

7.26 *Grapes*

7.26.1 The Stock/Scion compatibility trial at Plaisance Experiment station was cancelled and the plants uprooted, because of stunted growth, resulting from wind damage and especially drought during the bud-burst stage (September onwards) after winter dormancy.

7.26.2 A similar trial at Richelieu Experiment Station was in better condition and several vines had produced big fruit bunches, all of which disappeared before maturity.

7.26.3 The plants (cuttings) introduced from Australia in July 1977 were released from Quarantine greenhouse and planted out in March-April 1978. Sixty-three vines were planted in Richelieu Experiment Station, 47 being of table grape varieties and 16 being stock varieties. Ten cuttings were planted at Abercrombie nursery, ten at Pamplémousses Experiment Station and four at Palmar Livestock Breeding Station.

7.26.4 The plants were producing shoots after the December rains, but the new growth suffered heavily from insect damage.

7.26.5 Varieties of table grapes: Cardinal, Italia, Emperor, Sultana, Ruby seedless, Waltham cross, Ribier, Emerald seedless, Ohanaz and Nyora.

Varieties of stocks being propagated are: Teleki, 1613, Richter, Shwarzmann and Harmony.

7.27 *Anthurium*

7.27.1 The experiment on growing media was postponed because of lack of funds for the purchase of plants and shading material. The plants in the shed were adversely affected by sunlight as the existing shading material (bamboo) had been damaged by cyclone.

7.28 *Strawberry*

7.28.1 The plants in the Planting Date Trial at Curepipe Experiment Station had produced excessive vegetative growth and runners and the beds were overcrowded and unsuitable for fruit production. The experiment was cancelled.

7.28.2 The new varieties imported from Australia were transferred from Reduit to Curepipe Experiment Station. Some of these varieties were adversely affected through lack of water after transplanting, because of inadequate watering facilities. Lack of water was also the main reason for very low yield of fruits.

7.28.3 Yield of fruits was low in the Variety Trial, because of dry conditions, lack of water and much damage due to pests hence yield figures being unreliable for statistical comparison. (Table 7.38).

TABLE 7.38

YIELD OF STRAWBERRY FRUITS (kg/100 m²)

<i>Variety</i>			<i>Yield</i>
Tioga	...	...	32.58
Fresno	...	...	25.53
CR	...	...	19.64
1 - 4	...	...	15.28
1 - 8	...	...	18.53
Local	...	...	17.64

7.29 *Sugar Beet*

7.29.1 Four varieties of sugar beet: Satorave, Trirave, H 5117, and H 6116, all from the Netherlands, were planted in observational plots at Reduit Central Experiment Station and Curepipe Experiment Station in July 1978, and harvested in November 1978 (18 - 20 weeks crop duration).

7.29.2 Growth was more vigorous at Reduit and the yield of beet roots at Reduit (Table 7.39) was about twice the yield obtained at Curepipe Experiment Station, probably due to the acid nature of the soil (pH 3.6 - 3.9) at Curepipe.

TABLE 7.39

YIELD OF ROOTS AND TOPS (tonne/hectare)

Variety		Curepipe E.S.		Central E.S.		Suga % Juice
		Roots	Tops	Roots	Tops	
Satorave	...	32.81	24.44	58.24	45.44	16.0
Trirave	...	30.58	18.28	60.02	41.28	15.5
H 5117	...	22.01	15.54	51.26	29.08	13.5
H 6116	...	27.22	14.85	60.32	39.28	16.5

7.29.3 The yield of sugar expected at Reduit is more than two tonnes of sugar/arpent pure stand, for a crop duration of less than five months.

7.30 Watermelon

7.30.1 Six varieties of watermelon were grown at Richelieu Experiment Station in observational plots. Varieties included were: Ali and Charleston Gray from Sluis and Groot (Holland), Panonia No. 51 F-1 Hybrid and Charleston Gray from Royal Sluis (Holland), Hurst No. 338 and Sugar Baby.

7.30.2 The watermelon varieties grew well but the fruits suffered from heavy rainfall during the maturity stage causing premature ripening giving watery taste and splitting. The only new variety that can compare with Sugar Baby as regards size, yield and taste is Charleston Gray, though the shape, colour of skin and flesh of Sugar Baby are more appealing.

7.31 Melon

7.31.1 Two varieties of melon namely F1 hybrids No. 339 and 340 from Hurst (England) were grown in observational plots in Richelieu Experiment Station. The plants of both varieties did not grow well. Only a few fruits were formed which were very small in size and of very low quality.

SCIENTIFIC OFFICER: V. VEERAPA

7.32 Pole Lima Bean and Bush Lima Bean

7.32.1 The following varieties of Pole Lima Bean and Bush Lima Bean were planted on 8th March 1978 in an observational trial at Plaisance Experiment Station.

Varieties of Pole Lima Bean	Varieties of Bush Lima Bean
Carolina	Ford Hook
Prize Taker	Henderson
King of the Garden	Kingston
Burpee's Best	Improve Bush Lima

Seeds were sown in double rows. Distance between each double row was 60 cm. Distance between the two rows in the double row was 30 cm. Seeds were placed at a distance of 10 cm within each row. Each variety was planted in a different field on a plot of 4×3.90 m. The basal dressing adopted was 120 kg/ha triple Super phosphate and 120 kg/ha muriate of potash. A top dressing of 200 kg/ha Sulphate of Ammonia was applied two weeks after seed germination. All the varieties of Pole Lima Bean were staked. Only the dry pods were harvested. Harvest started on 17th June 1978 and ended on 17th August 1978. Table 7.40 gives the performance of the eight varieties of Lima Beans.

TABLE 7.40

PERFORMANCE OF EIGHT VARIETIES OF LIMA BEANS

Varieties	Seed yield kg/ha	Average number of seeds per pod	Average Pod length (cm)
Carolina ...	9,235	3 ± 1	6.9
Prize Taker ...	5,350	4 ± 1	12.9
King of the Garden ...	4,390	3 ± 1	8.5
Burpee's Best ...	1,540	3 ± 1	8.5
Ford Hook ...	1,690	4 ± 1	8.2
Henderson ...	5,855	3 ± 1	6.6
Kingston ...	2,985	3 ± 1	5.2
Improved Bush Lima	2,010	3 ± 1	9.4

7.32.2 The Entomology Division carried out an identification of the insect pests found on the Lima Beans. Table 7.41 gives the list of insect pests observed on the Lima Beans.

TABLE 7.41

INSECT PESTS OBSERVED ON THE LIMA BEANS

Varieties	Insect Pests	Plant Parts attacked
Carolina ...	Aphids—unidentified	leaves
	Leaf tiers— <i>Nacoleir praeteritalis</i>	leaves
	Pod borer—unidentified	Pods
Prize Taker ...	Aphids—Unidentified	leaves
King of the Garden ...	Red Spider— <i>tetranychus</i> spp.	leaves
	leaf tier— <i>Nacoleir praeteritalis</i>	leaves
	Pod borer—unidentified	Pods
Burpee's Best ...	Leaf miner—unidentified	leaves
	Pod borer—probably <i>Lampides bæticus</i>	Pods
Ford Hook ...	Pod borer—probably <i>Lampides bæticus</i>	Pods
Henderson ...	Pod borer—probably <i>Lampides bæticus</i>	Pods
Kingston ...	Pod borer—probably <i>Lampides bæticus</i>	Pods
Improved Bush Lima ...	Pod borer—probably <i>Lampides bæticus</i>	Pods

No serious disease has been observed on the Lima Beans.

7.32.3 *Conclusions*

The crop cycle of all the eight varieties were approximately the same. Variety Carolina seemed to be the best yielder among the Pole Lima Beans whereas Henderson produced the highest yield among the Bush Lima Beans. A variety trial may be performed to confirm their yielding abilities.

The Pole Lima Beans, which were all staked, provided a good soil cover two months after seed germination. Thus no weeding was necessary. However regular weeding was performed in the plots of Bush Lima Bean.

Varieties Carolina, King of the Garden and Burpee's Best were more susceptible to the attack of insects than the other varieties. However good control was obtained with the use of 'gardona' and 'lannate'.

7.33 *Soya Bean*

7.33.1 The International Soya Bean Variety Evaluation Experiment (INTSOY) was planted at Reduit Central Experiment Station on 1st March 1978. Unfortunately this experiment suffered sever damage from bird attack. It was impossible to post a bird-watcher on the trial site for financial reasons. The trial had to be abandoned.

7.34 *Peas*

7.34.1 *Variety Trial*

A pea variety trial was planted at Plaisance Experiment Station on 25th April 1978. The varieties tested were:

Alaska

Little Marvel

Burpee's Blue Bantam

Wando

Burpeeana Early Dwarf

Dwarf Gray Sugar

Varieties Little Marvel, Burpee's Blue Bantam and Burpeeana Early Dwarf were first harvested on 14th June 1978 while varieties Alaska, Wando and Dwarf Gray Sugar did not produce mature pods until 14th July 1978. Table 7.42 gives the performance of the six varieties.

TABLE 7.42
PERFORMANCE OF SIX PEA VARIETIES

<i>Varieties</i>	<i>Yield m. tons/ ha</i>	<i>Pod length (cm)</i>	<i>No. of seeds/ pod</i>	<i>Average Plant Height (cm)</i>
Alaska ...	2.847	6.4	5 ± 1	63.4
Little Marvel ...	2.051	6.8	4 ± 1	24.4
Burpee's Blue Bantam ...	1.635	7.5	3 ± 1	29.5
Wando ...	2.987	6.9	4 ± 1	45.8
Burpeeana Early Dwarf ...	1.765	6.2	5 ± 1	21.5
Dwarf Gray Sugar ...	2.525	7.1	5 ± 1	62.5
S.E of means $\pm$...	0.365			

7.34.2 Conclusions

No significant difference has been observed among the yields obtained. Varieties Little Marvel, Burpee's Blue Bantam and Burpeeana Early Dwarf have the advantage of a shorter crop cycle. But they have the drawback of being dwarf types, hence very poor yielders. Varieties Alaska, Wando and Dwarf Gray Sugar have a longer period of vegetative growth and so are taller crops and better yielders. Powdery Mildew was observed on all the six varieties. This disease was controlled by regular application of dithane M45.

7.34.3 Fertiliser Trial

A fertiliser trial on local pea was planted at Plaisance Experiment Station on 15th May 1978. The treatments were three levels of nitrogen and two levels of potash as indicated below:

N_1 = 100 kg/ha Sulphate of Ammonia

N_2 = 150 kg/ha Sulphate of Ammonia

N_3 = 200 kg/ha Sulphate of Ammonia

K_1 = 120 kg/ha Muriate of Potash

K_2 = 180 kg/Muriate of Potash

Table 7.43 gives the mean yields obtained by the different combinations of treatments.

TABLE 7.43
MEAN YIELDS OF LOCAL PEA AT DIFFERENT LEVELS OF NITROGEN
AND POTASH

<i>Treatment Combinations</i>	<i>Mean Yields m. tons/ha</i>
K_1N_1 ...	4.81
K_1N_2 ...	4.73
K_1N_3 ...	5.17
K_2N_1 ...	4.67
K_2N_2 ...	5.02
K_2N_3 ...	5.20
S.E. of mean $\pm$...	0.296

7.34.4 *Conclusion*

No significant difference in yield of peas was observed among the treatments.

7.34.5 *Spacing and staking trial*

A spacing and staking trial on local pea was planted on 15th July 1978. The treatments were:

$$(i) T_1 = 40 \times 7.5 \text{ cm}$$

$$T_2 = 50 \times 7.5 \text{ cm}$$

$$T_3 = 60 \times 7.5 \text{ cm}$$

$$(ii) \text{ Staking } (S_1) \text{ versus no staking } (S_2)$$

The yields obtained were generally very low due to the very dry conditions prevailing at Plaisance Experiment Station during that time. Table 7.44 gives the yields obtained by the different combinations of treatments.

TABLE 7.44

MEAN YIELDS OF PEAS AT SPACING AND STAKING TREATMENTS

<i>Treatments</i>		<i>Mean Yields</i> <i>m. tons/ha</i>
$T_1 S_1$	...	2.035
$T_2 S_1$	...	1.230
$T_3 S_1$	...	1.163
$T_1 S_2$	...	2.518
$T_2 S_2$	...	1.315
$T_3 S_2$	...	1.210
S.E. of mean $\pm$		0.3103

7.34.6 *Conclusion*

Analysis of the results has shown that staking has no effect on the yield of peas.

7.35 *Pole Bean, Bush Bean, Shell Bean and Pea*

7.35.1 The varieties listed below were planted in an observational trial in different fields at Plaisance Experiment Station.

<i>Variety</i>	<i>Source of seeds</i>
Pole Bean variety Kentucky Wonder	... Burpee Seeds Co.
Pole Bean variety Blue Lake—White seeded	... Burpee Seeds Co.
Shell Bean variety Red Kidney	... Burpee Seeds Co.
Bush Bean variety White Marrow Fat	... Burpee Seeds Co.
Bush Bean variety Burpee's Tender Pod	... Burpee Seeds Co.
Bush Bean variety Cordon	... Sluis and Groot Co.
Bush Bean variety Gordonco	... Sluis and Groot Co.
Bush Bean variety Slankette	... Sluis and Groot Co.
Pea variety Somette	... Sluis and Groot Co.
Pea variety Primette	... Sluis and Groot Co.
Pea variety Bonette	... Sluis and Groot Co.
Pea variety Polarette	... Sluis and Groot Co.

Bush Bean varieties White Marrow Fat, Burpee's Tender Pod, Cordon and pea varieties Primette and Bonette did not germinated at all.

7.35.2 Table 7.45 gives the performance of the above-mentioned varieties.

TABLE 7.45

PERFORMANCE OF POLE BEAN, SHELL BEAN, BUSH BEAN AND PEA

<i>Varieties</i>	<i>Seed Yield kg/ha</i>	<i>Pod length (cm)</i>	<i>No. of seeds/pod</i>	<i>Crop Cycle (days)</i>
Pole Bean variety Kentucky Wonder ...	6,805	16.2	6 ± 1	120
Pole Bean variety Blue Lake-White Seeded ...	4,820	11.4	6 ± 1	120
Shell Bean variety Red Kidney ...	5,450	10.1	3 ± 1	90
Bush Bean variety Gordonco ...	2,646	9.6	4 ± 1	105
Bush Bean variety Slankette ...	2,990	9.0	4 ± 1	105
Pea variety Somette ...	2,100	5.5	4 ± 1	105
Pea variety Polarette ...	2,255	4.5	3 ± 1	105

7.35.3 *Conclusions*

The Pole Bean varieties Kentucky Wonder and Blue Lake-White Seeded seem to be good yielders. They need to be tested in variety trials. The Shell Bean variety Red Kidney is being included in variety trials as it appears to be a high yielder as bean pulse.

All the above-mentioned varieties have been attacked by podborers, to which lannate proved to be efficient.

7.36 *Cowpea*

7.36.1 *Evaluation Trial for IITA*

This trial consisted in the comparison of 20 cultivars of cowpea (including the local variety) under local climatic conditions. Their performances are to be compared with those performed in other countries which are collaborating in an International programme for the evaluation of cowpea cultivars under the IITA aegis. The trial was planted on 24.2.78 at Curepipe Experiment Station. Harvest was carried out from 15.5.78 to 30.6.78. The fresh pods collected were dried. Table 7.46 gives the yield of dry seeds obtained.

TABLE 7.46

YIELD OF DRY SEEDS OF 20 VARIETIES OF COWPEA

<i>Varieties</i>	<i>Yield of dry seeds (m tons/ha)</i>
Vita-1 ...	1.54
Vita-3 ...	0.85
Vita-4 ...	0.31
Vita-5 ...	0.72
TV×33-1G ...	0.84
TV×66-2H ...	0.99
TV×289-4G ...	1.17
TV×337-3F ...	0.98
TV×930-01B ...	0.27
TV×944-02E ...	1.33
TV×1193-059D ...	0.74
TV×1193-7D ...	0.85
TV×1836-9E ...	1.09
TV×1836-150G ...	0.50
TV×1836-157G ...	0.60
TV×1836-429E ...	0.54
TV×1836-473E ...	0.74
TV×1843-1C ...	1.15
SVS-3 ...	1.51
Local ...	0.95

The results have been sent to IITA for analysis and interpretation.

7.37 Staff Movement

Scientific Officers I. Rajkomar and M. Ramtohum returned after having successfully completed the M.Sc. course in Saskatchewan and Illinois respectively. Mr. M. Ramtohum was appointed Acting Divisional Scientific Officer (Land Use Division) on his return to Mauritius. He was reverted to his substantive post, on the return of Mr. I. Rajkomar who was, in turn, appointed Acting Divisional Scientific Officer (Land Use Division). Technical Officer S. Chung Ting Wan was transferred to the Extension Division, at his request. Miss C. R. Jomadar, Technical Officer joined the staff of the Agricultural Division in November 1978, following her transfer from the Dairy Chemistry Division.

BELLE VUE STATION

CHINESE AGRICULTURAL TECHNICAL TEAM

7.38 Period covering January to June 1978

7.38.1 Total area under rice cultivation was 5.8 arpents (2.45 ha.) yielding 21.725 metric tons of paddy and averaging to 3.7 tons per arpent (8.9 tons/ha.). There were 4.18 arpents (1.76 ha.) devoted to production and

the average paddy yield was 3.94 metric tons per arpent (9.33 tons/ha.). The average paddy yield from the production unit in this crop was 25.4% higher than the corresponding crop in last year. The average paddy yield obtained from various experimental fields (1.62 arpents/0.68 ha.) was 3.26 metric tons per arpent (7.73 tons/ha.). All the harvested grains excluding those kept for planting were sent to the Richelieu rice milling station.

7.38.2 Rice Variety Trials

Six rice varieties were compared. A randomised complete block design with 6 replicates was adopted and variety TN1 was used as control. The plot size was 15 m² and the spacing between hills was 20cm × 16cm.

Results:

TABLE 7.47

PADDY YIELDS

Variety		tons/arpent	tons/hectare
Red Plum Zao	...	4.21	9.99
Kwang Er i 5 - 3	...	4.18	9.91
Chen Chu i no. 11	...	4.09	9.69
C.N.S. 1 - 2	...	3.96	9.38
TN 1 (check)	...	3.82	9.05
Kwang Loo i no. 4	...	3.42	8.11

Red Plum gave the highest yield followed by Kwang Er i 5 - 3 and Chen Chu i no. 11. Difference in the yields among these varieties did not reach significance level. The control variety TN 1 gave significantly lower paddy yield than the above three individual varieties.

7.38.3 In another trial, ten rice varieties were put under observation. A randomised complete block with three replicates was used. The control variety was Red Plum Zao and the plot size was 15 m².

Results:

TABLE 7.48

PADDY YIELDS

Variety		tons/arpent	tons/hectare
BG 34 - 8	...	4.16	9.86
Kwang Er i 5 - 3	...	4.12	9.76
Kwang Er i 5 - 3 - 0 - 3	...	4.08	9.67
IR 532 - 420 Hsuan	...	4.08	9.67
Red Plum Zao (ck)	...	3.99	9.46
IR 36	...	3.83	9.08
Kwang Loo i 4 - 5 - 1	...	3.76	8.91
Kwang Er i 5 - 3 - 10 - 1	...	3.62	8.58
Red Plum Zao 27 - 3	...	3.61	8.56
Kwang Loo i no. 4	...	3.55	8.41

The variety BG 34-8 was the top yielder followed closely by Kwang Er i 5-3, Kwang Er i 5-3-0-3 and IR 532 — 420 Hsuan. The yield differences between them were insignificant. These four varieties and the control variety Red Plum Zao gave significantly higher paddy yield than the other varieties. The variety Kwang Er i 5-3-10-1 had the longest growth cycle 132 days followed by Kwang Er i 5-3 which was 125 days. On the other hand, the growth cycles of Kwang Loo i no. 4 and Red Plum Zao 27-3 respectively 96 days and 103 days were the shortest. The other six varieties had growth cycles varying from 111 to 116 days.

7.38.4 *Trial on three rice croppings per annum*

Mean paddy yield for :

First cropping was 3.48 tons/arp. (8.24 tons/ha.)

Second cropping (5th November 1977-23rd February 1978)

Area 0.297 arpents (0.125 ha.) in 2 fields

Rice variety Kwang Loo i no. 4

Paddy harvested 898.5 kg

3.02 tons/arpent (7.16 tons/ha.)

The paddy yield was 5.2% higher than the corresponding past crop.

Third cropping (10th February—20th June 1978)

Area 0.297 arpents (0.125 ha.) in 2 fields

Rice varieties Kwang Loo i no. 4 (Block IV field 5)

Kwang Er i 5-3 (Block IV field 6)

Paddy harvested 879.5 kg

2.96 tons/arpent (7.01 tons/ha.)

The paddy yield was only 0.9% higher than the corresponding past crop.

The paddy yield for three croppings was 9.46 tons per arpent (22.4 tons/ha.).

The total paddy yield for three croppings was 9.46 tons per arpent (22.4 tons/ha.).

7.38.5 *Organic manures as basal dressings*

A latin square design was used. Each of the four different treatments received a total equivalent of 53 kg nitrogen per arpent.

In treatments A, B and C half of the total amount of nitrogen was applied as basal dressings in organic forms and the other half was top dressed with sulphate of ammonia at different stages of growth. The plot size was 12.25 m² and the rice variety was TN1.

Results:

TABLE 7.49

PADDY YIELDS				
<i>Treatment</i>	<i>%N on D.M.</i>	<i>Code</i>	<i>Tons/arpent</i>	<i>tons/hectare</i>
Chicken manure ...	2.45	C	3.84	9.10
Sulphate of amonia (check)	21.0	D	3.60	8.53
Compost		A	3.27	7.75
Cow manure		B	3.25	7.70

Statistical analysis showed that treatment C gave higher paddy yields than those of the other treatments and the difference was highly significant.

7.38.6 *Split application of ammonium sulphate experiment*

This was the fourth time the experiment was carried out. Details of treatments, design, plot size, spacing and rice variety were same as in the last year experiment 7.26.7.

Results:

TABLE 7.50

PADDY YIELDS				
<i>Treatment</i>			<i>Kg/arpent</i>	<i>Kg/ha.</i>
A (Check) ...	...	...	3705	8781
B ...	...	...	3622	8584
C ...	...	...	3605	8544
D ...	...	...	3560	8437

From analysis of variance, paddy yield difference among treatments was insignificant.

7.38.7 *Fungicidal trial to control rice sheath rot*

There were four treatments. The fungicides were applied on two occasions. The first one was carried out 50 days and the second one 65 days after transplantation. Plot size was 36.36 m².

Results:

TABLE 7.51

RESPONSE TO FUNGICIDE TREATMENTS				
<i>Treatment</i>			<i>Rate of application</i>	<i>Panicle affected rate %</i>
Blank (control) ...	...	...		20.5
Topsin (50 w.p.) ...	...	...	0.15g/m ²	15.4
Benlate (50 w.p.) ...	...	...	0.15g/m ²	18.25
Captan (50 w.p.) ...	...	...	0. 3g/m ²	18.5

The disease rates were lower in the treated plots than in the non treated plots. Topsin gave the best performance followed by benlate and captan. The paddy yield order also followed the same pattern.

7.38.8 *Rice stem borer control experiment*

Design and other details of experiment were the same as last year experiment 7.27.11 except that rice variety Kwang Er i 5 - 3 was used in place of TN 1.

Results:

TABLE 7.52

		MEAN PADDY YIELD —KG/PLOT OF 36.36 M ²				
<i>Treatment</i>		<i>kg</i>		<i>difference</i>		
D	...	...	36.55			
C	...	...	35.05	1.50		
B	...	...	33.70	2.85*	1.35	
A	...	...	30.80	5.75**	4.25**	2.90*

There was no significant difference in paddy yield between D and C. However, paddy yields in these two treatments were significantly higher than either in B or A. From borer attack assessment, plots treated with either D or C gave full control. On the other hand, the untreated plots were severely attacked.

7.38.9. *Rice cultivation using direct sowing method by machine*

An area of 0.319 arpent (0.134 ha.) of land was directly sown with rice seeds at the rate of 65 kg/arpent by machine. Twelve rows of rice were simultaneously sown in one go and spaced at 20cm apart. The sowing depth was 1 to 1.5cm. Weeds were checked by applying preforan (0.3 c.c/m²) at 2 to 3 days after the emergence of the first leaf. The soil was kept humid by admitting water every 8-10 days and allowed to dry naturally. The paddy yield was 3.12 tons per arpent (7.39 tons/ha.). The rice variety planted was Kwang Er i 5-3.

7.38.10. *Rice variety trial in ratoon sugarcane interrows*

The sugarcane variety was M13/56 and was on its second year ratoon with spacing 5ft×5ft. A randomised complete block design with three replicates was adopted. The plot size was 24 m² (mixed stand). The rice seed rate was 76 kg per arpent pure stand. Three rows of rice at 20 cm apart were sown in the five foot sugarcane interrow. The rice occupied 39.4% land surface of the sugarcane field. Overhead irrigation was used at three days interval with 12 mm of water per application.

Results:

TABLE 7.53

PADDY YIELDS

<i>Variety</i>	<i>Kg/arpent mixed stand</i>	<i>Kg/hectare mixed stand</i>
Kwang Chiet Chew	... 805.3	1908.6
Red Plum Zao (ck)	... 736.7	1746.0
Chen Chu i no. 11	... 699.8	1658.5
Kwang Loo i no. 4	... 633.0	1500.2
Lew Sew Chao	... 502.9	1191.9
Er Chu Chin	... 393.7	933.1

No significant differences in paddy yield existed among Kwang Chiet Chew, Red Plum Zao and Chen Chu i no. 11. However, these three varieties gave significantly higher yields than the other three varieties. Er Chu Chin gave the least paddy yield and its growth cycle was the shortest being 87 days followed by Lew Sew Chao (90 days). The growth cycle of Chen Chu i no. 11 was 106 days and was the longest. The other varieties had their growth cycles ranging from 100 to 102 days.

7.38.11 *Response of nitrogen in rice cultivated in sugarcane interrows*

Three levels of ammonium sulphate applied in split applications:— basal dressing 20%, three leaf stage 20%, six leaf stage 40% and nine leaf stage (panicle initiation) 20% were compared. The design adopted was a randomised complete block with six replicates. The sugarcane varieties were M13/56 and S17 (2nd year ratoon) at spacing 7ft×3ft. The plot size was 10 m² (pure stand). Six rows of rice at 20cm apart were sown in the seven foot sugarcane interrow. The rice variety used was Red Plum Zao.

Results:

TABLE 7.54

PADDY YIELDS

<i>Treatment Sulphate of ammonia</i>	<i>Code</i>	<i>Kg/arpent mixed stand</i>	<i>Kg/hectare mixed stand</i>
38 kg (ck) pure stand	A	... 600.5	1423.2
57 kg pure stand	B	... 658.0	1559.5
76 kg pure stand	C	... 746.3	1768.7

Statistical analysis showed that paddy yield differences among the treatments reached significant level. Treatment C was the top yielder followed by B.

7.38.12 *Optimum number of rice rows in 7 ft sugarcane interrows*

Details of experiment were same as last year experiment 7.27.9 except that the sugarcane was on its third year ratoon and the plot size was 18.78 m² mixed stand.

Results:

TABLE 7.55

MEAN PADDY YIELD (MIXED STAND)				
<i>Treatment</i>	<i>code</i>		<i>Kg/arpent mixed stand</i>	<i>Kg/hectare mixed stand</i>
5 rows	B	...	426.5	1010.8
4 rows	A	...	409	969.3
7 rows	D	...	530.3	1256.8
6 rows	C	...	370.8	878.8

From statistical analysis, no significant difference existed in paddy yield between the various treatments.

7.38.13 *Vegetables*

The station produced 858 kg of bitter gourd, 705 kg. sponge gourd and 236 kg of wax gourd. Heavy rains in April adversely affected the vegetables yields.

7.38.14 *Mushroom*

One batch of rice strawmushroom was cultivated. An average yield of 7 kg fresh mushroom per 100 kg of straw was obtained. The low yield of mushroom was due to non vigourous aged mycelluim.

7.38.15 *Fruits trees*

2,135 kg of citrus fruits consisting of golden seal orange, Eureka frost lemon and tangelo were collected for the first time from 114 citrus trees planted in December 1975 and February 1976. Through an assessment, it was found that 17% of the citrus trees were affected by gumming disease. Fungicides M45, topsin and benlate were applied as paste to the affected part after the diseased bark portion was removed. M45+topsin mixture was found to be effective in checking the disease.

162 citrus graftings were planted out in the field during the first half of the year of which 107 had their scions dipped in 1,000 l.u. tetracyclin solution prior to budding to the rootstocks for testing of greening disease control. In February, scions of 13 different varieties of citrus trees from the newly established Palmar citrus orchard were budded to rootstocks at Belle Vue Station. 2 to 5 graftings of each variety were planted out in the Belle Vue orchard.

7.39 *Report for period covering July to December 1978*

7.39.1 Total area under rice cultivation was 5.416 arpents (2.285 ha.) giving a total yield of 23.51 metric tons of paddy, averaging to 4.34 tons of paddy per arpent (10.29 tons/ha.).

TABLE 7.56

Cultural method	PADDY YIELDS					
	Area planted		Average yield		Total yield m. tons	
	arp.	ha.	m. tons/ arp.	m. tons/ ha.		
Transplanted rice	...	3.69	1.56	4.58	10.85	16.89
Direct sowing rice	...	1.726	0.73	3.84	9.10	6.62
		—	—	—	—	—
TOTAL	...	5.416	2.29	4.34	10.29	23.51
		—	—	—	—	—

Kwang Er i 53 was the main rice variety grown in this crop. It occupied 80% of the total area under rice. The remaining 20% was under Ko Hsuan 7 and TN1.

7.39.2 *The following rice experiments were carried out*

- (i) Machine sown rice cultivation
- (ii) Herbicidal trial in machine sown rice field
- (iii) Nitrogen response in machines sown rice cultivation
- (iv) Fungicidal trial to control rice sheath rot.

7.39.3 *I. Machine sown rice cultivation*

Three water regimes were used:—

(a) Overhead irrigation

Immediately after sowing, the fields were overhead irrigated with 30mm of water. Then 10-12mm water applied every two day interval till emergence of shoots. From then on 16mm water once every three days.

(b) Surface irrigation

The rice fields were submerged with a thin layer 1 - 2cm of water after sowing. Water was allowed to percolate. The fields are irrigated again after 5 to 6 days and then at weekly interval to keep the soil at saturation point.

(c) Flood irrigation

Soil was kept fully saturated. From germination to three leaf stage, the soil is covered with 1-2cm of water. Fields were flooded once every 4 to 5 days.

Results are tabulated below:—

TABLE 7.57

PADDY YIELDS

Water regime	Area planted		Paddy yield m. tons	
	arpent	hectare	per arp.	per ha.
Overhead	... 0.317	0.134	3.85	9.12
Surface irrigation	... 0.313	0.132	4.18	9.91
Flood irrigation	... 0.783	0.331	4.63	10.97
TOTAL	... 1.413	0.597	4.21	9.98

7.39.4 II. Herbicidal trial in machine sown rice cultivation

Five herbicides were tested:—

- A. Preforan 30 E.C. at 0.3 cc/m²/application
- B. Avirosan 50 E.C. at 0.05 cc/m²/application
- C. D.C.M.U. 80 W.P. at 0.05g/m²/application
- D. Tok 7.7G at 2g/m²/application
- E. Ronstar 50 E.C. at 0.12c.c/m²/application
- F. Blank (control)

Two applications were carried out, the first one 5 days after sowing and the following one at three leaf stage.

A randomised complete block design with 3 replicates was used. The plot size was 25.7 m² and overhead irrigation was used.

TABLE 7.58

MEAN PADDY YIELD PER PLOT

Treatments	Kg	difference					
A	... 19.91	—	—	—	—	—	—
B	... 19.80	0.11	—	—	—	—	—
C	... 18.66	1.25	1.14	—	—	—	—
D	... 16.38	3.53*	3.42	2.28	—	—	—
E	... 14.90	5.01**	4.90**	3.76*	1.48	—	—
F	... 12.71	7.20**	7.09**	5.95**	3.67*	2.19	—
L.S.D. 5%		3.32					
		1%	4.72				

Both Preforan and Ronstar gave good control of weeds. They were slightly toxic to the rice plants which recovered quite quickly. From observation, D.C.M.U. seriously and adversely affected the rice seedlings.

7.39.5 *III Nitrogen response in machine sown rice cultivation*

Four levels of nitrogen in the form of ammonium sulphate were tested.

A 38 kg N/arp.

B 50 kg N/arp.

C 63 kg N/arp.

D 76 kg N/arp.

The nitrogen was applied on five occasions:—

Basal dressing ... 20%

Three leaf stage ... 20%

Six leaf stage ... 20%

Panicle initiation ... 30%

Heading stage ... 10%

Each treatment also received 25 kg P_2O_5 and 38 kg K_2O per arpent.

A randomised complete block design with 4 replicates was used. The plot was 32 m².

Results:

TABLE 7.59

MEAN PADDY YIELD (KG/PLOT)					
	<i>Treatment</i>		<i>Kg</i>	<i>difference</i>	
A	...	...	15.56		
B	...	...	16.96	1.40	
C	...	...	19.93	4.37**	2.97*
D	...	...	19.85	4.29**	2.89* 0.08
			L.S.D. 5%	2.44	
			L.S.D. 1%	3.51	

Paddy yield differences among treatments were highly significant. Yield differences between A and B, C and D were insignificant. Treatment C was the top yielder followed by D. The poorest yield was given by treatment A.

7.39.6 *IV. Fungicidal trial to control rice sheath rot*

Five fungicides were tested:—

A Topsin 50 W.P. 0.15 gm/m²/application

B Benlate 50 W.P. 0.15 gm/m²/application

C Captan 50 W.P. 0.3 gm/m²/application

D Sumisclex 50 W.P. 0.15 gm/m²/application

E Rovral 50 W.P. 0.15 gm/m²/application

F untreated (control)

The design was a randomised complete block with 3 replications and the plot size was 21.46 m². The fungicides were applied two times at 50 days and 65 days after transplanting.

From assessment, it was found that disease rate is lowest in treatment D followed by treatment A, whereas it was highest in the control treatment. Paddy yield difference among the treatments were not significant.

7.39.7 Rice variety trial in 2nd year ratoon sugarcane

Design	...	...	Randomised complete block with 3 replicates
Treatment	...	...	Six
Plot size	...	...	27.4 m ² (mixed stand)
Sugarcane variety	...	...	S 17 (2nd year ratoon)
Sugarcane spacing	...	...	4 feet × 6 feet
Rice seed rate...	...	...	63 kg/arp. (pure stand)
Rice spacing	...	...	5 rows of rice at 20 cm apart per 6 foot sugarcane interrow. 32.8% of cane field occupied by rice cultivation.

Results:

TABLE 7.60

Variety	kg/plot	MEAN PADDY YIELD (MIXED STAND)					
		difference					
Red Plum Zao (ck)...	6.08	—	—	—	—	—	—
Chen chu i No. 11 ...	5.12	0.96	—	—	—	—	—
Kwang Chiet Chew...	4.91	1.17*	0.21	—	—	—	—
Kwang Loo i No. 4...	4.80	1.28*	0.32	0.11	—	—	—
Lew Sew Chao ...	3.74	2.34**	1.38*	1.17*	1.06*	—	—
Er Chu Chin ...	3.20	2.88**	1.92**	1.71**	1.60**	0.54	—
L.S.D 5%	1.06						
1%	1.5						

From Statistical analysis, paddy yield differences among varieties were highly significant. The variety Red Plum Zao gave the highest yield followed by Chen Chu i no. 11. No significant difference in yield existed between them. The other four varieties yielded much lower than Red Plum Zao and difference in yield reached significance level. In the cases of Lew Sew Chao and Er Chu Chin the difference in yield was highly significant.

7.39.8 Optimum number of rice rows in 7 ft. sugarcane interrows

Design	...	...	randomised complete block with 4 replicates
Treatments	...	...	Four
Plot size...	...	...	17.78 m ² (mixed stand)
Sugarcane varieties	...	...	S17 and M13/56 (4th year ratoon)
Rice variety	...	...	Red Plum Zao

Results:

TABLE 7.61

MEAN PADDY YIELD PER PLOT				
<i>Treatment</i>		<i>Kg</i>	<i>difference</i>	
7 rows	...	3.60		
6 rows	...	3.35	0.25	
5 rows	...	2.74	0.86*	0.61
4 rows	...	2.62	0.98*	0.73* 0.12
		L.S.D.	5%	0.70
		L.S.D.	1%	1.01

Significant yield differences existed among treatments. Paddy yield increased with the increase in the number of rice rows per 7 ft sugarcane interrows. Treatment D gave significantly higher paddy yield than either B or A. Treatment C also gave significantly higher yield than A.

From statistical analysis, paddy yield differences among treatments reached significance level. Treatment C gave the highest paddy yield. Paddy yield difference between C and A was significant. However, no significant differences in paddy yield existed between C and B, B and A.

7.39.9 *Nitrogen response in rice cultivated in sugarcane interrows*

Design: Randomised complete block with 6 replications.

Treatments: A. 38 Kg N/arpent pure stand (control)

B. 57 Kg N/arpent pure stand

C. 76 Kg N/arpent pure stand.

Plot size ... 10 m²
 Sugarcane varieties ... S17 and M 13/56 (3rd year ratoon)
 Spacing ... 7 ft. × 3 ft.
 Rice variety ... Red Plum Zao.
 Rice spacing ... Six rows of rice at 20 cm apart in the 7 ft sugarcane interrows.

Results:

TABLE 7.62

MEAN PADDY YIELD (Kg/10M ²)			
<i>Treatment</i>		<i>Kg</i>	<i>difference</i>
A	...	3.06	
B	...	3.41	0.35
C	...	4.16	1.10* 0.75
		L.S.D.	5% 0.99
		L.S.D.	1% 1.41

7.39.10 *Production trial of rice in sugarcane interrows*

1 An area of 261.4 m² of sugarcane field planted to variety M13/56, 2nd year ratoon, spaced at 4 ft×6 ft was planted to rice variety Kwang Chiet Chew in its 6 ft sugarcane interrows. Six rows of rice at 20 cm apart were planted in 6 ft interrow. A total of 142.5 Kg of paddy was harvested or 906.6 Kg paddy per arpent mixed stand.

2. A third year sugarcane field planted to variety M 13/56 spaced at 5 ft×5 ft was used for rice cultivation in its interrows. The rice was sown in 3 rows at 20 cm apart in the 5ft interrows. Percentage of sugarcane field under rice was 39.4. Details of results are tabulated below:—

TABLE 7.63

PADDY YIELDS

Rice variety	Area	Paddy yield (mixed stand)	
		Kg	Kg/ arpent
Red Plum Zao ...	128 m ²	57	740.4
Kwang Chiet Chew ...	127 m ²	50	652.7

7.39.11 *Sweet potato variety trial*

Design randomised complete block with 3 replicates.

Treatments nine.

Plot size 16.8 m² (1.2 m×14 m).

Mound height 30 cm.

Spacing 1.2 m×26 cm in single row.

55 cuttings planted per mound.

TABLE 7.64

MEAN FRESH TUBER YIELD (KG PER PLOT)

Variety	Kg		Difference						
You 70—9	131.3	—	—	—	—	—	—	—	—
Kwan Tung 16	120.5	10.8	—	—	—	—	—	—	—
SM4 (control))	119.5	11.8	1.0	—	—	—	—	—	—
Chow Nung 69-219	115.2	16.1	5.3	4.3	—	—	—	—	—
Chain 64-285	112.0	19.3	8.5	7.5	3.2	—	—	—	—
Little Leaf	111.0	20.3*	9.55	8.5	4.2	1.0	—	—	—
Leek	89.0	42.3**	31.5**	30.5**	26.2*	23.0*	22.0*	—	—
Peking	83.3	48.0**	37.2**	36.2**	31.9**	28.7**	26.7*	5.7	—
Chestnut	79.5	51.8**	41.0**	40.0**	35.7**	32.5**	31.5**	9.5	3.8

L.S.D. 5% = 19.6

1% = 27.1

Fresh tuber yield differences among treatments were highly significant. No significant yield difference existed among Yue—70—9, Kwang Tung 16, SM 4 (control), Chow Nung 69—219 Chain 64—285. The above varieties, gave significantly higher yield than varieties Leek, Peking and Chestnut. Little leaf gave significantly lower yield to Yue 70—9 only. Yue—70—9 gave the higher tuber yield followed by Kwang Tung 16, whereas Chestnut gave the lowest yield.

7.39.12 *Fruit trees.*

The majority of the 161 citrus fruit trees, formerly treated with antibiotic tetracyclin to control citrus greening disease, planted in December 75/ February 76 were growing normally with the exception of about ten trees among them which suffered from gumming disease. All the trees flowered in August and September and the fruit yield is expected to be more abundant than in the previous year. The 162 citrus trees newly planted in the beginning of the year were growing well. The Eureka lemon trees grew vigorously and some of them already bore fruits.

7.39.13 *Vegetables*

Areas grown and respective yields are tabulated below:

TABLE 7.65

YIELD OF VEGETABLES

<i>Crop</i>		<i>Area arp.</i>	<i>Total Yield Kg.</i>	<i>Yield Kg/arp.</i>
Bitter gourd	...	0.3174	2824	8897
Sponge gourd	...	0.0793	781.5	9842
Wax gourd	...	0.0317	1126	35205
Cheehqua wax gourd	...	0.0158	504	31962
Cucumber	...	0.0158	415.5	26297
Long bean	...	0.0158	164	10306
Water melon	...	0.1600	2938.5	18371

7.39.14 *Straw mushroom.*

Bagasse of sugarcane was used as raw material for cultivation of mushroom, but the trial failed completely. During the Open Day period at Belle Vue Station, two batches of mushroom were cultivated one indoor and one outdoor for demonstration. The former yielded 14 kg fresh mushroom per 100 kg of rice straw piled up and the latter the ratio was 9.1 to 100.

VIII. Plant Pathology Division

HEAD OF DIVISION: G. M. LALLMAHOMED, DIVISIONAL SCIENTIFIC OFFICER

8.1 The Plant Pathology Division is responsible for the prevention and control of plant diseases.

Phytosanitary control is exercised at ports of entry on plant material to prevent the introduction of foreign diseases and pests into the country. Plant material is also examined for freedom from diseases and pests prior to export. Research investigations were mainly carried out on strain variation of the bacterial wilt organism (*Pseudomonas solanacearum*), seed pathology, control of ginger blight and onion diseases, virus diseases of tobacco, chilly and cucurbits. New crop introductions were assessed for resistance to main diseases. Advice on plant disease control measures was given to the farming community through the Extension Services of the Ministry.

8.2 Research Investigations

8.2.1 Bacterial wilt (*Pseudomonas solanacearum*) stain variation

G. M. LALLMAHOMED, N. YERRIGADOO AND S. SOOMARY

Research on bacterial wilt strain variation was completed in September 1978. Major aspects of strain variation in the bacterial wilt organism were investigated with special reference to the epidemiology of the disease in Mauritius and are summarized below:—

1. Ninety seven isolates of *Pseudomonas solanacearum* were isolated from various diseased hosts collected throughout the island; single virulent isolates were selected for studies on the variability of the pathogen.
2. *In vitro* studies showed that all isolates were uniform in their cultural, physiological and biochemical characteristics. Colony characteristics as well as sensitivity to antibiotics were not useful in differentiating between isolates. However Mauritian isolates differed from the standard United States tobacco-race isolate (K 60) and the Colombian tobacco-race isolate (G 7) in many respects including colony appearance on TTC medium and biochemical properties.
3. Temperature relations and growth rates of some representative isolates indicated some differences among isolates but these were not of value in strain differentiation. The optimum growth temperature of these isolates was found to be between to be between 30-32°C.
4. Mauritian isolates did not differ in their carbohydrate utilization pattern; all of them belong to biotype 3 according to the Hayward's classification (Hayward, 1964)*. Biotype 2, the potato biotype was not encountered among several potato isolates.
5. Comparative studies of the host range of the pathogen showed that Mauritian isolates differed in their relative virulence to tobacco, groundnut, chilly, *Casuarina* and *Oxalis*. "Virulence" and "susceptibility" indices were calculated and used to detect variability in the Mauritian isolates. Virulence indices ranged from values of 73.9 for tobacco isolates to 45.7 for *Oxalis* isolates. Tobacco isolates were highly virulent to a wide range of hosts. *Oxalis* isolates were not pathogenic to many hosts including potato. Susceptibility indices indicate that tomato and potato were highly susceptible hosts; tobacco had low susceptibility while ginger was unaffected upon inoculations by the root inoculation method.
6. Isolates could not be classified into distinct pathotypes but a tobacco pathotype was very exacting, in that, isolates from that host only could infect tobacco. The ginger pathotype as well as the low temperature strains of the potato race were not encountered among Mauritian isolates.

*Hayward, A.C. 1964. Characteristics of *Pseudomonas solanacearum*. J. Appl. Bacteriol. 27 : 265-277

7. Race classification using tobacco, *Musa balbisiana* and potato according to the method of Buddenhagen, Sequeira and Kelman (1962)** indicated that Mauritian isolates could be classified into two races viz. Race 1 (tobacco race) and Race 3 (potato/tomato race). Infiltration of bacterial suspensions into tobacco leaves confirmed the presence of the two races in the island. The banana Race 2 was not encountered.
8. Serological studies using a few representative isolates were not useful in the differentiation of strains among Mauritian isolates which appeared to be serologically related to each other. The United States isolate K 60 and the Colombian isolate G 7 were not serologically related to the Mauritian isolates.
9. Field experiments confirmed the existence in Mauritius of isolates which differed in their virulence to various hosts. Isolates of the tobacco race 1 were highly virulent to tobacco whereas isolates of the potato tomato race 3 were of low virulence to tobacco.
10. In crop sequence experiments, repeated culture of a susceptible tobacco variety invariably increased wilt damage in that host. The cropping system could have exerted a selection pressure for the more virulent pathotype to such an extent as causing breakdown of resistance in an otherwise resistant tobacco variety.
11. Rotation experiments carried out with special relation to the control of the disease in tobacco indicated that only immune crops or long fallow periods could reduce wilt in the resistant tobacco variety by a significant level.
12. Greenhouse experiments confirmed that high inoculum levels of the tobacco pathotype as well as high temperature and moisture could have contributed to the breakdown of resistance in the tobacco variety NC 95, thus accounting for the occasional outbreaks of the bacterial wilt disease in that variety under field conditions.

8.2.2 Seed Pathology—(J. BUCHA AND I. RAMDIN)

Health analysis of 8 cultivars of rice and 14 vegetable seeds was carried out by the blotter method. Two hundred-seed samples were incubated on three layer moist blotters in 9 cm. disposable plastic petri dishes under 12hr/12hr Near Ultra Violet (NUV) light/darkness cycles for 8 days. The plates were examined under a Wild M3 stereomicroscope fitted with two side lamps.

*Buddenhagen, I.W., Sequeira and A. Kalman. 1962. Designation of races in *Pseudomonas solanacearum*. *Phytopathology* 52 : 726 (Abstr.)

Results are tabulated below :

TABLE 8.1.

SEED-BORNE DISEASES RECORDED ON 8 RICE CULTIVARS					
Rice cultivars	No. of samples tested	No. of samples without infection	Main pathogens encountered marked X		
			<i>Trichoconis padwickii</i>	<i>Fusarium spp.</i>	<i>Dreschlera oryzae</i>
IR-532-208	23	2	X	X	X
IR-532-9334	10	0	X	X	X
IR-532-9319	5	1	X	X	—
IR-305-4-7-11	1	0	—	X	—
IR-665-6291	5	0	X	—	—
IR-665-6292	9	0	X	X	X
6383	9	4	X	—	—
Nagpur 22	1	1	—	—	—

The percentage infection of the rice seeds due to *Trichoconis* (*Alternaria*) *padwickii* varied between 1.5 and 66.5 while those due to *Fusarium* spp and *Dreschlera oryzae* were under 6%.

Infections recorded in the vegetable seeds were normally low except for *Colletotrichum* sp. and *Fusarium* spp. on Okra (local B 39/77).

Fusarium semitectum on watermelon and *Phomopsis*/*Phoma* spp. on egg plant (Rosita RBS 7/77) were recorded at above 60%.

8.2.3 *Virus Disease Investigations*

M. I. DOSSA AND W. M. W. KHIM CHENG

8.2.3.1 *Chilly*

Mottling of leaves, leaf deformation (with or without fruit malformation) of *Capsicum annum* were shown to be caused by potato virus Y (PVY) by differential host reactions and serological techniques. This finding has been further confirmed by electron-micrographs (shown on photograph) which showed the existence of elongated virus particles estimated to be 750 nm long. Subsequent immunomicroscopical tests have confirmed the existence of PVY. Additionally, electron microscopy has revealed the existence of isomeric particles of cucumber mosaic virus in isolated cases of multivirus infections.

Stability in Sap

In *C. annum* sap, the thermal inactivation point of PVY is 50 - 55°; dilution end point is 10—3.

Transmission

Results show no evidence to support the seedborne nature of the virus in *C. annum*. Insect vector and dodder transmission is under study.

Resistance Testing

6 varieties of *C. annum* were tested in 10 replicates. None was resistant to PVY.

TABLE 8.3

REACTION OF 6 VARIETIES OF *C. ANNUM* TO PVY

<i>C. annum</i> vars	<i>Symptoms produced on inoculation</i>
Chinese Giant ...	Mosaic, leaf and fruit malformation
Yolo Wonder ...	Mosaic, leaf and fruit malformation
Ruby King ...	Mosaic, leaf and fruit malformation
Dunpath ...	Mosaic, leaf and fruit malformation
Long Thin Cayenne ...	Mosaic only
Anaheim ...	Mosaic only

8.2.3.2 *Tobacco**Variety Trial Experiment*

An assessment was carried out on a variety trial experiment set up by the Agronomy Division at Richelieu Experiment Station. Nine varieties were laid out in a randomized block design with 4 replicates. Every individual

plant was assessed for symptoms of mosaic, veinal necrosis and weather-fleck. Results are recorded below:

TABLE 8.4

REACTION OF 9 TOBACCO VARIETIES TO DISEASES LISTED

<i>Tobacco varieties</i>		<i>Plant showing Mosaic symptoms (%)</i>	<i>Plants showing veinal necrosis symptoms (%)</i>	<i>Plants showing weather-fleck symptoms (%)</i>
NC 95	...	5.0	0.8	11.4
SC 66	...	1.4	0.0	3.5
Speight G-28	...	13.2	0.0	6.4
Coker 347	...	5.2	0.0	8.5
SC 72	...	0.0	6.4	0.0
Speight G-33	...	9.2	5.3	5.0
SC 71	...	3.5	0.0	1.4
SCR	...	5.8	0.0	1.4
Coker 86	...	0.0	0.0	14.2

Serological tests were restricted to tobacco mosaic virus (TMV). All varieties, except varieties SC 72 and Coker 86, reacted positively giving a band formation in gel-diffusion tests. The tolerance of varieties SC 72 and Coker 86 to TMV was shown previously under greenhouse conditions.

All 9 varieties were tested against CMV and were found to be free from the virus.

Planting data experiment

An experiment involving 5 different planting dates was set up by the Agronomy Division in a randomized block design with 4 replicates. A single variety, namely var. NC 95, was used. Each plant was individually assessed. The results are recorded below:

TABLE 8.5

REACTION OF TOBACCO VARIETY NC 95 TO VARIOUS DISEASES

<i>Planting date</i>		<i>Plant showing Mosaic symptoms (%)</i>	<i>Plant showing veinal necrosis symptoms (%)</i>	<i>Plant showing weather-fleck symptoms (%)</i>
Mid February	...	13.0	1.3	1.3
Beginning March	...	21.7	0.8	1.7
Mid March	...	14.3	0.8	1.3
Beginning April	...	17.7	1.7	3.3
Mid April	...	17.7	1.3	1.3

The incidence of TMV, one of the most important viral diseases of tobacco was highest in plots planted during the beginning of March and lowest in plots planted during mid February. Further experimentation is required for confirmation of the results.

8.2.3.3 Survey

A survey of virus diseases of tobacco was undertaken and the identification of viruses was based solely on serological tests involving among other tests, immunodiffusion plates containing sodium dodecyl sulphate according to the method of Gooding and Bing (1960)*.

Tobacco mosaic was recorded in practically all the fields visited.

Veinal necrosis (attributed to PVY) was unusually severe at Richelieu Experiment Station and Notre Dame.

Weather fleck was observed at Belle Mare, Richelieu Experiment Station and Notre Dame.

No cases of cucumber mosaic or leaf curl was encountered.

8.2.3.4 Cucurbits

Serological investigations started for the detection of viruses affecting cucurbits have so far shown the following to be infected by cucumber mosaic virus: watermelon var. Sugar Baby, Squash var. Crookneck Ranger, calabash (*Lagenaria* spp.) bittergourd var. CAM and pumpkin. Both watermelon and calabash showed severe fruit malformation.

8.2.4. Chemical Control of ginger blight (*Pyricularia* sp.)

M. PILLAY AND MISS N. RUGHOO

Introduction

In a field trial set up at Royal Botanic Gardens, Pamplemousses since February 1978, four fungicide treatments were evaluated for the control of the blight of ginger caused by *Pyricularia* sp. (zingiberi).

Materials and Methods

Treatments and control were replicated six times in a complete randomized block; each plot consisting of six rows 6 m long. Plants were spaced apart 30cm within a row and 50 cm between rows.

Spots were found scattered in all plots at the time of the first fungicide spray. Spraying was carried out weekly from 12 May to 28th July by means of a knapsack sprayer and at the rate of 2 litres per plot at 45 p.s.i. Insecticide 'Nuvacron' (1ml/litre) was incorporated in spray solutions every fortnight.

Disease severity was assessed on 16 June, 30 June, 14 July and 28 July as follows: the fourth leaf was plucked from 20 plants picked at random from the two middle rows of each plot, placed in labelled plastic bags and brought to the laboratory where an absolute count of leaf spots was taken. In September, rhizomes from the same rows were lifted, freed of soil particles and weighed.

* Gooding & Bing, 1960. Serological identification of potato virus Y and tobacco etch virus using immunodiffusion plates containing sodium dodecyl sulphate. *Phytopathology* 60 : 1293

Results and Discussion

The results have been statistically analysed and are summarised below:—

TABLE 8.6

DISEASE SEVERITY AND YIELD					
Treatment/ Dosage	Mean no of leaf spots per 4th leaf				Yield of rhizomes in kg from 12m
	16 June	30 June	14 July	28 July	
Dithane M-45 2g/l ...	0.98 ^a	1.32 ^a	4.54 ^a	0.38 ^a	11.79 ^a
Dithane M-45+ Topsin 'M' ¼g +1g/l ...	3.08 ^a	2.35 ^{ab}	2.76 ^a	3.14 ^{ab}	11.70 ^{ab}
Benlate ½g/l ...	2.95 ^a	2.74 ^{ab}	0.64 ^a	5.98 ^{ab}	10.25 ^{abc}
Topsin 'M' ½g/l	3.44 ^a	5.34 ^b	8.80 ^a	8.74 ^b	9.82 ^c
Control ...	12.7 ^b	18.84 ^c	139.78 ^b	200 ^c	7.09 ^d

Note : Means followed by different letters differ significantly ($P=0.05$) by Duncan's Multiple Range Test.

All the fungicide treatments gave significantly better disease control and higher yield than the control. Although there was not much difference among the treatments so far as leaf spot control was concerned, Dithane M45—treated plots again gave a significantly superior yield than the other fungicides. Topsin 'M' which was tested for the first time proved to be as good as Benlate and performed very well in combination with Dithane M-45.

The possible indirect effect of Dithane M-45 on the plant physiology, owing to the presence of Zinc and Manganese ions, has been indicated elsewhere and may, perhaps, explain the higher yields obtained with that chemical.

8.3 Assessment of Resistance to Main Diseases in various crops

8.3.1 Resistance to bacterial wilt and root-knot nematode (*Meloidogyne spp.*) in tomato

N. B. YERRIGADOO AND G. M. LALLMAHOMED

Tomato varieties imported from overseas were assessed for bacterial wilt (*Pseudomonas solanacearum*) and root-knot nematodes (*Meloidogyne Spp.*) at Pamplémousses Experiment Station from March to July 1978. Seeds were sown on 1.3.78., earthballed after a further period of 15 days. Test varieties were planted between two rows of the very susceptible local 'pomme d'amour'. Disease counts were made at fortnightly intervals.

On 25.7.78. plants were uprooted and assessed for rootgalling. Results are tabulated below:

TABLE 8.7

RESISTANCE TO BACTERIAL WILT AND ROOT-KNOT NEMATODE IN INDICATED TOMATO VARIETIES

Variety		Bacterial Wilt Percentage	Root-knot nematode (<i>Meloidogyne</i> Spp.) Disease index
Carette	...	36.	25.05
Crac 53-6-2	...	20.34	16.28
Saturn	...	60	10
B.W. 118	...	28.57	3.68
B.W. 125-2-2	...	38.46	12.66
B.W. 124	...	81.25	7.5
B.W. 128	...	67.86	8.88
Cra 53 RCB	...	29.35	9.54
Royale Ace	...	100	—
B.W. 127	...	75.86	17.14
Venus	...	51.58	27.61
Pomme d'amour	...	97.93	66.

From results obtained, four new tomato lines appear to possess adequate resistance to both *Pseudomonas solanacearum* and *Meloidogyne*. They are as follows: Carette; Crac 53-6-2; B.W. 118 and CRA 53-RCB. Further trials are necessary during the hot humid season.

8.3.2 Resistance to Root-Knot nematodes in tobacco

S. HANOOMANJEE & MISS N. RUGHOO

Nine varieties of tobacco were assessed for root knot nematode resistance in a variety trial conducted by the Agronomy Division at Richelieu Experiment Station during the two tobacco seasons of the year. There were four replicates of each variety. Twenty plants of each replicate were uprooted at harvest time and assessed for galling by *Meloidogyne* spp., according to the rating system adopted by Zeck (1971). Results are shown in table 8.8.

TABLE 8.8.

RESISTANCE OF NINE TOBACCO VARIETIES TO MELOIDOGYNE SPP.

Variety	Mean Disease Index	
	1st Season	2nd Season
SC 72	11.38 ^{bc}	9.36 ^a
SCR	10.50 ^b	24.75 ^{bc}
SC 71	2.63 ^a	28.50 ^c
Coker 86	2.37 ^a	12.36 ^a
SPG 28	2.25 ^a	5.88 ^a
SPG 33	1.38 ^a	5.75 ^a
SC 66	0.75 ^a	5.88 ^a
Coker 347	0.63 ^a	14.13 ^{ab}
NC 95	1.50 ^a	7.50 ^a
S.E.	± 3.126	± 7.36

All the varieties except SC72 and SCR appear to be quite tolerant to root rot nematodes.

8.3.3 Cowpea disease assessment — (J. BUCHA AND I. RAMDIN)

A visual assessment was carried out in a Cowpea Variety Trial at urepipe Experiment Station on behalf of the Agronomy Division.

Rust, anthracnose (*Colletotrichum truncatum*), powdery mildew, zonate leaf spots (*Ascochyta* sp.) and *Cercospora* leaf spots were observed and assessed in that order of importance.

Out of the twenty cultivars involved only Vita-5 (TVu-4557) was found to be quite tolerant to the above diseases followed by Vita-4 (TVu. 1977-01) and Vita-1 (TVu. 201-1D).

8.4. Occurrence of Diseases

8.4.1 Herbicide damage

Herbicide affected crop plants accounted for the greater part of material submitted to the Division by the Extension Services during the year. The crops most commonly affected were tomato, okra, brinjals. Two cases of damage caused by the 'Polaris' ripener were also reported.

8.4.2 Onion and Garlic

Blast and Purple blotch were again of common occurrence. A severe case of collar rot in onions was reported from Constance.

A garlic variety from South Africa planted on several estates and by a number of large growers was badly affected by an unidentified disease or insect pest.

8.4.3 *Egg-plant*

Wilt of egg-plant (*Phomopsis vexans*) was devastative in all areas. All egg-plant varieties planted locally are susceptible to the disease.

8.5. *Plant Protection Service*

8.5.1 *Exports*

Commercial exports consisted mainly of cut-flowers (*Anthurium* sp.), fresh ginger and ornamentals. Non-commercial exports consisted of tropical fruits, vegetables and various lesser known ornamentals.

3170 phytosanitary certificates were issued during the year, 917 of which were for commercial exports. Monthly active growth inspections of mother plants for export-oriented *Anthurium* nurseries was continued for 28 such nurseries around the island. Nursery owners were advised to perform sprays of pesticides at fortnightly intervals.

Gunny bags destined for exportation were fumigated with methyl bromide under tarpaulin on several occasions.

The new fumigation plant at Fort George is now almost completed and is to be commissioned shortly.

8.5.2 *Imports*

1037 import permits were issued for the importation of vegetable and flower seeds, fresh fruits, table and seed potatoes, onion, garlic and maize.

8.5.3 *Control at Ports of Entry*

Phytosanitary control was exercised during the arrivals of 320 ships and 2750 planes.

Commercial consignments of agricultural produce entering the country were examined.

At Plaisance Airport, 440 items of plant and animal material were intercepted and destroyed. 104 items of plant material were released after thorough examination. Two consignments of fresh strawberries and peaches had to be re-shipped back to their countries of origin by their respective carriers owing to non-observance of phytosanitary regulations.

At Port Louis sub-office, 37 items were detained because of deficient documents, 13 of which subsequently released after presentation of the appropriate phytosanitary certificate. On behalf of the Division of Veterinary Services, 786 landing permits were issued in respect of frozen meat products. On four occasions live animals had to be re-shipped back by the same carriers to their respective countries of origin due to unauthorized landing. Live insects were imported on three occasions for research purposes and were handed over to the Entomology Division.

8.5.4 *Plant Quarantine*

Plant material released from Quarantine during the year included:

- (a) 15 varieties of vine from Australia
- (b) 2 varieties of cotton from India
- (c) 12 varieties of potatoes
- (d) Anthurium plantlets from Netherlands
- (e) 17 apple plants from France
- (f) Anthurium plantlets from France.

The following are presently undergoing quarantine:

- (a) Onion bulbs from USA
- (b) Pineapple from South Africa.

Fees collected

Fees collected at Port Louis and Reduit Offices were as follows:—

Rs 17,129 for inspection and certification and Rs 1,678 for various treatments to plant material. Active growth inspection fees for export-oriented crops amounted to Rs 2,290 while fees collected for the quarantine of plants amounted to Rs 185.

8.6 *Miscellaneous*

8.6.1 *Study Leave*

The Divisional Scientific Officer was on study leave at the University of Ibadan, Nigeria from 27th July to 18th November 1978. Mr. J. Bucha, Scientific Officer, acted as Divisional Scientific Officer during that period.

8.6.2 *Higher degree*

The degree of Doctor of Philosophy of the University of Ibadan, Nigeria, was awarded to the Divisional Scientific Officer (G. M. Lallmahomed) in October 1978 for his thesis entitled "Strain variation of *Pseudomonas solanacearum* E.F. Sm. in relation to the epidemiology of bacterial wilt in Mauritius". The work was conducted on a part-time basis in the Plant Pathology Division of the Ministry of Agriculture, Reduit under a collaborative research programme with the Pathology Division of the Mauritius Sugar Industry Research Institute.

8.6.3 *Meetings*

Mr. J. Bucha (Scientific Officer) attended the First IATA Regional Facilitation meeting held at Belle Mare Plage Hotel on 7th November, 1978.

Mr. M. Pillay (Scientific Officer) attended the 14th Meeting of the OAU's Inter African Phytosanitary council held in Cairo, Egypt from 22-27th November 1978. The delegate from Mauritius was elected Vice-Chairman at that meeting.

IX. Entomology Division

HEAD OF DIVISION: M. J. L. MONTY, DIVISIONAL SCIENTIFIC OFFICER

9.1. *Integrated Control of Stable Flies*

9.1.1 *Biological Control (J. Monty and I. Balluck)*

9.1.1.1 *Production and Release of Parasites of Stomoxys nigra*, Laboratory production of the main parasite of *Stomoxys nigra*, *Tachinaephagus* sp. was continued and releases effected at several localities, mainly in the high fly density zone.

The breeding of *Trichopria* sp. was discontinued as the data obtained on parasitism in the field indicate that it is not an effective parasite.

The colony of *Tachinaephagus* again underwent extreme fluctuations and as was the case during 1977; sufficient parasites for release could be obtained only during the period July to November. The production and release of parasites for the year are given in Table 9.1. A total of about three million parasites were released.

9.1.2 *Recovery of Parasites*

The parasitism of *S. nigra* was evaluated from collections of pupae for ecological studies in different regions of the humid and super-humid zones. Results are tabulated in Table 1.1.2 and 1.1.3. Parasitism was generally higher in the super-humid zone than in the humid zone. The highest percentage recorded was at Quartier Militaire (43.3%).

Tachinaephagus sp. was found in all regions of the island, in small numbers in the humid zone and in higher numbers in the super-humid zone. It was collected throughout the year, the highest rates of parasitism recorded being in May (52.1%).

Table 9.2 and 9.3 show that the parasites occur throughout the year in many localities. As far as *Tachinaephagus* sp. is concerned, these results are very satisfactory, because the parasite is a new species introduced from Uganda in 1972. The table 9.3 also shows that the percentage of flies which actually emerge from the pupae collected in the field averages 49.8% for the whole island. This rate of eclosion from the pupae is lower than expected for the species which in the laboratory, exhibits rates above 80% (see table 9.11). Flies emerge from pupae within 10 days of collection, whereas parasites take up to 4 weeks to emerge. The efficacy of the parasites in nature may therefore be much greater than that indicated by observed rates of parasitism. The average rates of eclosion of flies are lower in the super-humid zone (48.5%) than in the humid zone (60.0%). These figures confirm the observation that the parasite *Tachinaephagus* sp. is more abundant in the super-humid than the humid zones.

9.2 Chemical Control of Stable Flies (J. MONTY AND I. BALLUCK)

9.2.1 Effect of Dimilin on the reproduction of *Stomoxys nigra*

The effect of Dimilin (an "insecticide" interfering with chitin deposition) on the fertility of *Stomoxys nigra* was evaluated by surface contact. Dics of Whatman's filter paper were soaked in 1 ml. of aqueous solutions of Dimilin at concentrations 0.2%, 0.6% and 1%, placed in petri-dishes and allowed to dry. Water was used in the control. 5 pairs of *S. nigra* (0-24 hours old) were introduced into the petridish and left for 48 hours.

After treatment the flies were held in cages and their fecundity and fertility determined. Table 1.2.1 gives the results. Complete sterility was obtained with 0.6 and 1% solutions. Field tests are being made.

9.2.2 Insecticide Trials on Cattle in Pasture (J. MONTY AND I. BALLUCK)

14 head of cattle (4-7 month old) were kept in open pastures since September 1977 from 7.00 a.m. to 6.00 p.m. They were sheltered at night. During the period November-December 1977, the whole herd was treated with Ciodrin.

In January the bulls were divided into two groups to evaluate the effect of Permethrin on *Stomoxys*, and the weight gain of the animals. The two groups were separated, taking into consideration their colour and weight. They were kept in adjacent paddocks during the day and in the same shed separated by a fence during the night. Weekly fly counts were taken on the animals, two from each group. Treatment with Permethrin at the rate of 1 litre solution of 0.1% a.i. was carried out on one group of animals whenever the average fly count per animal reached 200.

The animals were treated twice in January and seven times during the period October-November. The weights, fly counts and treatments are given in Table 1.2.2. The weight gain in the treated animals was greater than in the control. However they required treatment only during period January and September-October-November.

The fly counts on the treated and untreated animal during the period of treatment are given in Table 1.2.3. Although Permethrin may have a repellent action, there was no difference in the counts obtained on the treated animals and the control. Accidental contamination of untreated animals when they were brought back to the shed during the night, cannot be ruled out.

TABLE 9.1

PRODUCTION AND RELEASE OF PARASITES (TACHINAEPHAGUS SP.)
OF *S. NIGRA*

Locality	No. of Parasites Released				
	July	August	September	October	November
La Brasserie ...	10,920	46,301	—	76,554	—
Chamarel ...	—	359,692	56,921	34,349	—
Ferney ...	—	—	45,233	317,514	—
Henrietta ...	40,795	163,989	86,112	132,224	—
Melrose ...	108,392	—	—	—	—
M. Blanche ...	—	50,350	53,422	83,102	—
N. Decouverte ...	—	96,432	—	—	—
Q. Militaire ...	—	52,728	—	36,404	—
Reduit ...	50,308	120,045	183,649	71,454	—
Rose Belle ...	—	—	63,420	43,338	—
St. Aubin ...	—	—	30,221	81,784	7,562
Sans Souci ...	—	123,368	—	—	—
Savannah ...	—	—	30,327	—	—
Vuillemin ...	—	75,398	146,471	—	—
Verdun ...	—	34,850	—	—	—
Pamplemousses ...	—	—	122,421	167,720	—
Palma ...	—	—	—	35,186	—
Total No. released ...	210,415	1,123,153	818,197	1,079,629	7,562
No. Produced ...	578,644	1,950,217	1,720,002	2,094,946	573,462

TABLE 9.2

Parasitism in *S. nigra* from pupae collected in sugarcane fields

Month	Super-humid Zone						Humid Zone					
	No. of pupae observed	No. of flies emerged	Percentage Parasitism			Total	No. of pupae observed	No. of flies emerged	Percentage Parasitism			Total
			Tachinae-phagus sp.	Trichopria sp.	Solitary parasites				Tachinae-phagus sp.	Trichopria sp.	Solitary parasites	
January	750	271	13.7	6.5	4.9	25.1	180	122	2.2	0.6	1.7	4.5
February	392	94	36.5	6.6	3.1	46.2	99	54	3.0	1.0	10.1	14.1
March	157	94	1.9	2.5	0.6	5.0	66	29	NIL	NIL	7.6	7.6
April	27	16	11.1	11.1	NIL	22.2	25	15	NIL	NIL	NIL	NIL
May	236	47	52.1	13.6	0.8	66.5	NIL	—	—	—	—	—
June	229	102	25.3	13.1	NIL	38.4	NIL	—	—	—	—	—
July	92	41	34.8	7.6	1.1	43.5	9	7	22.2	NIL	—	22.2
August	1115	839	11.9	3.0	0.4	15.3	292	205	5.1	1.0	1.0	7.1
September	1036	642	20.1	3.3	2.5	25.9	482	239	18.0	1.5	4.1	23.6
October	2288	910	37.5	3.0	0.5	41.0	485	255	4.5	6.4	4.5	15.4
November	1372	770	1.5	1.5	3.1	6.1	402	296	1.5	0.2	4.7	6.4
December	407	106	21.1	3.7	3.7	28.5	167	102	1.2	1.2	11.4	13.8
Average	—	48.5	22.3	6.3	1.7	30.3	—	60.0	5.8	1.2	4.5	11.5

TABLE 9.3

PARASITISM IN STOMOXYS NIGRA FROM PUPAE COLLECTED IN SUGAR-CANE FIELDS DURING YEAR 1978

Locality	No. of Pupae observed	No. of flies emerged	Percentage Parasitism			
			Total	Tachinae-phagus sp.	Trichopria sp.	Solitary Parasites
Bassin-Palma ...	441	232	20.4	7.0	3.9	9.5
Chamarel ...	445	221	23.1	19.3	1.6	2.2
Ebène ...	1457	736	22.1	13.9	4.5	3.7
F.U.E.L. ...	52	28	32.6	1.9	28.8	1.9
Henrietta ...	2873	1463	21.8	15.7	4.0	2.1
Midlands ...	835	583	12.2	7.1	2.9	2.2
Q. Militaire ...	1864	560	43.3	41.4	1.7	0.2
Rose Belle ...	312	199	5.8	1.3	1.0	3.5
St. Aubin ...	561	330	7.2	1.8	0.2	5.2
Sans Souci ...	929	468	25.5	16.8	7.0	1.7
Savannah ...	414	247	8.4	2.2	4.3	1.9
Average ...	—	49.8	20.2			

TABLE 9.4

EFFECT OF DIMILIN ON FERTILITY OF STOMOXYS NIGRA

Dosage	Total eggs laid (Total of 3 Replicates)	Percentage hatch
Control	1797	68.7
0.2%	1573	8.2
0.6%	1761	NIL
1%	1690	NIL

TABLE 9.5

WEIGHT GAIN BY ANIMALS GRAZING IN THE OPEN

Date	Average live weight/Bull (kg.)	Average gain in weight (kg) and No. of days	Daily weight gain/bull (gm)	Maximum No. of flies/animal	Treatment
<i>Exp.</i>					
12. 1.78	140.1429	—	—	—	Once-Permethrin
14. 2.78	149.2857	9.1428(33)	277	65	Once-Permethrin
23. 3.78	166.4286	17.1429(37)	463	77	
16. 5.78	197.8333	31.4047(54)	582	121	
26. 8.78	239.5714	41.7381(102)	409	115	
27. 9.78	242.2857	2.7143(32)	85	99	} Five-Permethrin
26.10.78	253.2857	11 (30)	367	97	
27.11.78	277.7143	24.4286(32)	763	55	
<i>Control</i>					Two-Permethrin
12. 1.78	140.4286	—	—	—	
14. 2.78	143.4286	3. (33)	91	65	
23. 3.78	155.4286	12. (37)	324	58	
16. 5.78	172.8571	17.4285(54)	323	130	
26. 8.78	203.4286	30.5715(102)	300	65	
27. 9.78	215.8571	12.4285(32)	388	165	
26.10.78	226.5714	10.7143(30)	357	124	
27.11.78	238.5714	12. (32)	375	47	

TABLE 9.6

FLY COUNTS DURING TREATMENT WITH PERMETHRIN

Date	Average No. of flies/animal		
		Exp. (Treated)	Control
3.10.78	...	14	21
10.10.78	...	24	16
17.10.78	...	84	69
23.10.78	...	97	124
31.10.78	...	34	47
7.11.78	...	55	26
13.11.78	...	7	17
21.11.78	...	12	13

9.1.3. Physical Control by traps in Cowbyres (J. MONTY AND R. SONOO, TECHNICAL OFFICER)

9.1.3.1 Introduction

Studies on the control of stable flies in cow byres with funnel traps started in September 1977 and have been continued throughout the year 1978. From the previous year's results, it was shown that these traps collected large numbers of stableflies in byres and could be used as a cheap fly control technique on a country-wide basis.

In the course of the year 1978, the Division received many requests from cowkeepers of different localities to have funnel traps placed in their cowbyres. However, the Division could not meet with all the demands as only a limited number of traps were available,

9.1.3.2 Localities under study

For the purpose of the study, funnel traps were placed, in the following localities of the Moka district: Vuillemin, Quartier Militaire, Providence, Melrose, Montagne Blanche and Petit Paquet. These regions fall in the humid and superhumid zones of Mauritius and hence have a high fly density. Traps were also placed at Esperence, Dagotière, Belle Terre (Trianon) and Camp Beuvieux, but captures could not be evaluated in these localities due to labour and transport problems.

Altogether, about 25 traps were in place by December 1977, but only 15 were being collected in the localities under study for the purpose of evaluation of catches.

9.1.3.3 Evaluation Methods

The funnel traps were collected on Mondays, Wednesdays and Fridays or on the following day when it was not possible to collect them on these specific days. These traps were replaced by clean ones. The collected traps, with their flies, were brought to the laboratory for evaluation.

The following measures were made on the captures from each trap:

- (i) Total weight of flies caught.
- (ii) Weight of samples of 100 flies taken from each trap.
The above two measures would give approximately the number of flies captured.
- (iii) Species composition based on the samples of 100 flies.
- (iv) Sex ratio of *Stomoxys nigra* in samples of 100 flies.
- (v) Nutritive state of flies as determined by a simple squash test.

The last three measures were discontinued in July, enough data having been collected.

9.1.3.4 Results

Data have been analysed in different ways so as to give a broad view on this method of control of stable flies with funnel traps. Results are summarized in tables 9.7 to 9.10.

9.1.3.5 Table 9.7—These figures prove the efficacy of funnel traps in their use as a means of control for stable flies. Therefore, the large number of flies caught was rather expected as the study areas fall in a high fly density zone due to abundant rainfall. Variations in the captures for the summer months are due to the occasional occurrence of drought conditions. For example, in October, the number of flies caught per trap was 99,501. In November, the number fell to 30,659 while in December it increased to 42,453. The high fly density from August to January is related to the sugarcane harvesting period. With adequate moisture and optimum temperatures cane refuse and debris provide widespread sources of development for *Stomoxys nigra*, causing seasonal increases in populations.

9.1.3.6 Table 9.8 shows the effect of the type of byre on the number of flies caught per trap. Straw byres seem to offer the least protection to animals kept in them. This is due to the fact that straw huts have many small interstices between straw bundles and allow entry of flies inside. The concrete byre offers maximum protection to housed animals, while a corrugated iron sheet byre lies intermediate.

9.1.3.7 Table 9.9 shows that *S. nigra* is the predominant species of stable flies caught in the funnel traps, accounting for 99.7% of the total number of flies captured for this period and is similar for all the other months of the year. Only 0.3% consists of *Stomoxys calcitrans*. This low percentage of *S. calcitrans* might be due to the unsuitability of development sites. Breeding sites of *S. calcitrans* are limited to manure pits adjacent to the cowbyres. In the very humid zones, these breeding sites are submerged in water and thus are unfavourable for production of *S. calcitrans*. On the other hand, the sugarcane fields provide almost permanent breeding sites for *S. nigra*.

The sex ratio of male to female *S. nigra* caught in the traps has been found to be around 2:3. The higher number of females may probably be explained by the fact that more females enter the byres for feeding on the animals.

9.1.3.8 In table 9.10—Monthly captures per trap have been grouped for each locality. The mean results show that all the localities are situated in high fly density zone. The lower figures for Providence and Montagne Blanche could tentatively be explained by (a) the byre at Montagne Blanche built of concrete throughout while that of Providence has concrete walls and a corrugated iron sheet roof (b) there was only one trap under study in each of these two localities.

9.1.3.9 The popularity of the funnel traps in the villages is a good indication of the value of the technique in stable fly control. The trap is cheap, easy to install and needs to be cleaned only 2 to 3 times per week.

TABLE 9.7

MONTHLY CAPTURE OF STABLE FLIES PER TRAP YEAR 1978

Month	No. of traps in place	Total No. of flies caught	No. of flies per trap per month
January	9	120,676	13,408
February	9	67,328	7,481
March	9	126,626	1,403
April ...	8	12,367	1,546
May ...	10	13,285	1,328
June ...	10	14,818	1,482
July ...	10	23,933	2,393
August	11	393,618	35,783
September	12	766,687	63,891
October	15	1,293,516	99,501
November	15	459,893	30,659
December	15	636,799	42,453

TABLE 9.8

NUMBER OF STABLE FLIES CAPTURED MONTHLY IN DIFFERENT TYPES OF BYRES FOR THE PERIOD AUGUST TO DECEMBER 1978

	Type 1 : Straw hut	Type 2 : Concrete shed	Type 3 : Iron Sheet Shed
August	50,606	15,952	34,312
September	71,546	23,980	56,902
October	56,621	44,261	57,140
November	24,357	14,819	16,376
December	61,558	25,867	39,685
Average number of flies per day ...	1,730	816	1,336

TABLE 9.9

SPECIES COMPOSITION, SEX RATIO AND NUTRITIVE STATE OF TRAPPED FLIES
 BASED ON SAMPLES COLLECTED DURING PERIOD MAY-AUGUST 1978,
 EXPRESSED AS % OF TOTAL FLY CATCHES

Locality	<i>S. nigra</i>				% Ecl.	<i>S. calcitrans</i>
	♂	%	♀	%		
Petit Paquet ...	...	39.47	59.77	...	82.6	0.76
Montagne Blanche ...	...	38.46	61.42	...	79.5	0.12
Melrose ...	...	45.06	54.07	...	62.0	0.87
Providence ...	...	40.86	59.14	...	—	0
Quartier Militaire ...	...	39.83	60.17	...	84.0	0
Vuillemin ...	...	42.77	57.07	...	93.0	0.15
Average ...	...	41.07	58.61	...	80.2	0.32

Note : House flies and hover flies (Latrine flies) were also collected in very small numbers

TABLE 9.10

MONTHLY CAPTURE OF STABLE FLIES
 PER TRAP IN EACH LOCALITY

	<i>Vuillemin</i>	<i>Quartier Militaire</i>	<i>Providence</i>	<i>Melrose</i>	<i>Montagne Blanche</i>	<i>Petit Paquet</i>
January ...	18,880	—	0	18,386	10,582	17,534
February ...	4,409	—	0	8,102	11,548	13,174
March ...	788	—	0	1,400	1,846	2,807
April ...	128	—	0	2,074	4,671	1,843
May ...	0	999	0	0	0	2,960
June ...	0	426	0	0	4,951	2,360
July ...	0	1,211	0	3,673	2,686	4,053
August ...	39,427	1,065	10,586	61,715	15,952	40,932
September ...	72,726	46,171	39,176	32,488	23,980	58,318
October ...	130,850	87,935	127,454	86,504	44,261	67,643
November ...	21,898	24,011	28,867	49,384	14,819	25,370
December ...	30,950	38,408	27,595	53,325	25,867	46,264

9.1.4 Control of Stable Flies by Sterile Insect Technique

SCIENTIFIC OFFICER — M. RAMSAMY

9.1.4.1 Introduction

Four aspects of studies on the control of the stable fly *Stomoxys nigra* Macquart by the Sterile Insect Release Method were investigated namely:

- (a) the feasibility of mass producing the insect;
- (b) radiobiological studies in the laboratory;
- (c) the field behaviour of flies reared and sterilized in the laboratory and
- (d) ecological studies.

9.1.4.2 *Mass rearing of S. nigra*

Mass rearing of *S. nigra* was tested from January up to September. Table 9.11 presents data on egg and pupal production during this interval. The mean daily egg production fell within the expected range. During two months, January and April, production of egg was somewhat low. It is thought that the low egg production in January was due to the passage of clone Fleur, when feeding of both larvae and adults had to be interrupted. The other changes have also been noted to depress egg production. For instance, whenever there were electrical shortages, many ovipositing adults died prematurely. This could possibly have been due to feeding adults on composed blood.

Pupal production fluctuated within the expected range, 100,000 pupae/day.

TABLE 9.11

EGG AND PUPAL PRODUCTION

Interval	Mean daily input of pupae	Mean % eclosion	Mean daily output of egg (ml)	Mean % egg hatch	Mean volume of 500 pupae (ml)	Mean daily volume of pupae (ml)	Mean daily output of pupae
January 1978	... 28,800	82.3	39.0	77.2	12.4	2,283	95,236
February	... 28,800	82.6	42.5	77.9	13.2	2,819	107,531
March ...	... 28,800	86.1	53.3	75.9	12.1	2,848	118,079
April ...	... 28,800	80.2	39.0	75.9	13.6	2,699	99,035
May ...	... 28,800	82.9	43.6	77.9	13.8	2,668	96,587
June ...	... 28,800	88.1	47.5	80.3	13.5	2,683	99,927
July ...	... 28,800	87.3	45.4	80.2	13.4	2,731	102,102
August	... 28,800	89.4	46.0	79.7	13.4	2,732	102,251
September	... 28,800	87.2	45.6	80.6	13.2	2,902	109,918

From 17 October 1978, some slight modifications were made in the method of rearing larvae. On the date of seedlings of egg (e.g. day 0) 800 g elephant grass (or sugarcane leaves), 150 g of soft wheat bran and 50 g wheat flour were thoroughly mixed and then divided into 3 portions $\frac{1}{3}$ kg, one portion per each of 3 larval trays. 42 trays were daily prepared this way. 5000 ml of tap water were then added to each tray. On day 3, the larval medium in each tray was tilled with a fork in order to loosen and aerate the matrix and a similar amount of fresh diet together with 10 ml of water were added again. On day 7 the tray was opened once more and this time only 200 ml of water were added. Pupae were collected on day 10.

The larvae were reared under ambient room conditions and $\frac{1}{2}$ ml of eggs were seeded per tray instead of 1ml. When reared in this way, to produce about 40,000 pupae daily, the following materials were required monthly (table 9.12)

Although rearing under ambient laboratory condition caused much electrical economy, output of insects per available space was very low.

TABLE 9.12

Commodity		Amount
Grass	...	64 $\frac{1}{2}$ kg
Pollard (soft wheat bran)	...	120 kg
Wheat flour	...	40 kg
Blood	...	336 litres
Trisodium citrate	...	2.04 kg
Formalin	...	2.0 litres

9.1.4.3 Radiobiological studies

Mortality and sterility studies were performed with the newly acquired caesium 137 gamma source to compare its effect with that of the Co 60 therapy unit of the Princess Margaret Orthopaedic Centre, Candos.

Mortality tests

Pupae belonging to 3 different age groups, viz; freshly harvested, 1 day old, 2 days old, 3 days old and 4 days old, were respectively treated in batches averaging about 100. The dosage tested ranged from 1 KR up to 15 KR. For each age group a batch of pupae was left untreated to serve as control.

Among the youngest age group a drastically high mortality level was achieved with very low dossages. Among freshly harvested pupae, 99.8% and 100% mortality was achieved with 10 KR and 11 KR respectively. When 1 day old pupae were irradiated, 100% mortality was achieved with 14 KR.

As pupal age advanced, the effect of radiation on mortality became further and further attenuated. After two days it would appear that a great number of pupae had already passed the development point at which the tested dosages would induce somatic damage which might have affected eclosion.

9.1.4.4 Sterility studies

About 10,000 four days old pupae were divided into two equal groups. One group served to produce untreated flies and the second one was subdivided into batches averaging about 500. The sub-groups were then treated with 7 doses of radiation viz: 1KR, 1.5 KR, 2.0 KR, 2.5 KR, 3.0 KR and 40 KR. Each treated batch of pupae was put on a piece of wet sponge in a plastic cup and allowed to develop into adults in a cage. Adults emerging within 24 hours were sexed and for each treatment, 40 males were paired with an equal number of untreated females in a test cage. A control cage consisting of 40 untreated males and 40 untreated females was made and

The eight cages were then arranged in a randomized block design. A second set of crosses consisting of treated females and untreated males together with appropriate control, using in each case 40 pairs of adults, was also established. The flies were fed twice daily and eggs were harvested from them during five consecutive days, starting on the day of first oviposition. The total number of eggs laid and the number of females dying per day were noted. Sterility was evaluated by calculating the mean percentage hatch of five random samples of 200 eggs.

An increase in male sterility with an increase in radiation dosage was noted. Dose for dose, higher levels of sterility were achieved with the Cs 137 source than with Co 60 source. With the Cs 137 source, doses of 1KR, 2 KR, 3 KR and 4 KR produced 88.9%, 97.4%, 98.9% and 100% sterility respectively, whereas with Co 60 source, the same sequence of dosages produced 85.5%, 96.6%, 98.9% and 100% sterility respectively.

Two types of sterility were inducible to females:

1. dominant lethality, reflected in unhatchability of eggs; and
2. infecundity, loss of oviposition ability.

Similar results were obtained with the Co 60 source in 1974 (Ramsamy 1975). However, the dose required to achieve cessation of oviposition at that time was much higher i.e. 3.0 KR. It is thought that the Caesium source sterilizes the insects with a lower dose of radiation than the Cobalt source because the former, a more powerful source, is capable of delivering a much faster rate of radiation than the latter.

9.1.4.5 *Male competitiveness tests*

To compare the mating competitiveness of irradiated males with untreated (or wild) males for females, the following were jointly examined:

- (a) the % hatch of eggs laid by individual untreated females sampled after they have been caged with treated and untreated (or wild males).
- (b) the sperm content of the dissected spermathecae of these females after that they had produced eggs.

9.1.4.6 *Effect of radiation on male competitiveness*

9.1.4.6.1 *Marked sterilized males compared to marked untreated males*

Marked treated and untreated laboratory reared flies were released in the ratio of 1:1, 2:1 and 4:1 in three large fly cages (at Reduit) respectively. Six days later, all the flies in each cage were captured with sweep nets. Fifty untreated females of each cage were isolated singly in transparent plastic cups. Each female was fed twice daily and induced to lay at least one brood of eggs on a piece of wet cloth.

The eggs of each individual were incubated for 48 hrs. in a water saturated atmosphere at 30°C and then examined to find out whether it had been inseminated by a sterile or fertile male. After having laid eggs, the female was killed and its ovipositor was dissected in Ringer's solution. Its spermathecae were then removed and examined for the presence or absence of sperm.

It was found that the level of competitiveness of males rose slightly as the proportion of males treated with 3 KR increased. However, even at the highest test ratio of treated to untreated flies, the competitiveness of treated males did not exceed that of the untreated males.

Flies treated with 4 KR showed relatively lower levels of competitiveness than those irradiated with 3 KR. Also, the ascending trend in competitiveness with an increase in number of treated flies was not observed among the group receiving 4 KR of gamma rays.

9.1.4.6.2 *Marked sterilized males compared to unmarked wild males*

Freshly emerged two-day-old flies treated while in the late pupal stage with 4 KR of gamma rays, were marked with yellow fluorescent powder and released daily in batches varying from 800 to 1,000 in the field cages. Fifteen days from the time of release, when a sufficiently wide spectrum of age groups of flies was available, some of them were caught by means of sweep nets and brought to the laboratory.

Wild flies were also caught by means of funnel traps exposed at cowbyres for a 24 hr. period. The wild flies were examined at the laboratory and an equal number of males and females were selected and released in an adult cage. Recaptured marked treated males and females in equal number, together with a batch of 100 six day old untreated virgin laboratory females which were marked with neon red powder, were then introduced into the cage.

The cage was then left exposed in a cowbyre for three days to allow a sufficient number of the untreated virgins to become inseminated under field conditions and during that interval the flies were fed twice daily on warmed citrated blood. At the end of the 3rd day, the trap was brought to the laboratory and the untreated females were enclosed individually in plastic cups and reared until they lay. They were then killed and examined to determine whether they were inseminated or not.

The results indicated that the competitiveness of sterile males fluctuated considerably. Even in crosses containing similar ratio of sterile to wild flies, competitiveness was not consistent.

In three out of a total of eleven trials, marked sterilized males proved to be more competitive than wild ones and on five other occasions their competitiveness exceeded 70%. These results are fair indications that males treated with 4 KR of gamma radiation compared not too unfavourably with wild flies in their mating behaviour despite that they were marked with fluorescent powder.

9.1.4.7 *Field behaviour of laboratory reared and sterilized flies*

The site of dispersal studies

The village of Henrietta, the area where the dispersal experiment was conducted, is situated in the district of Plaines Wilhems, about 3 miles from the town of Curepipe. It consists of about 200 houses, a village hall, a school, church and two temples. The site of studies was in the west of the village, the Henrietta Sugar Estate. Several of the villagers were small dairy farmers owning one or two cows and six of them who lived in the vicinity of the study area were willing to allow their respective cowsheds to be fitted with a funnel trap.

RELEASE AND RECAPTURE

Flies treated with 4 KR of gamma rays and untreated laboratory reared flies were carried in their respective containers to the point of release by means of a Jeep. The treated flies were marked yellow and the untreated flies, neon-red. The containers were then opened and the healthy adults allowed to fly away. On the day of release one trap was fixed in each of the six cowsheds. Daily, for five consecutive days, they were removed and replaced by fresh ones. The removed traps were brought to the laboratory where the captured flies were killed with cold and examined in the dark with the help of an ultra violet lamp.

At each trap point, a larger proportion of untreated flies were captured though treated and untreated flies were released in approximately equal numbers. The sterilizing dosage of radiation had the effect of decreasing the overall fitness of flies. Radiation could have affected the flies by causing:—

- (a) damage to their flight muscles;
- (b) damage to the senses responsible for their orientation;
- (c) other somatic damage causing premature mortalities.

The number of released flies captured decreased exponentially with time. The greatest catch was obtained on the first day after release and on subsequent days fewer and fewer flies were captured.

9.1.4.8 *Ecological studies*

Sampling of pupae for the estimation of the daily emergence of *S. nigra* in the super-humid and humid zones were continued. Samplings were carried out in such a way that the age class marks of trash fell alternatively in phase and in half phase with the sampling periods.

To render estimation of numbers and monthly rates of increase more precise, some slight modifications were introduced in the method of computations.

The population census for *S. nigra* for the year 1978 confirmed the results obtained during 1977. It is now firmly established that the carrying capacity of the environment for *S. nigra* is in a dynamic state governed solely by the state and abundance of sugarcane trash available. The population shows a pattern with a yearly period of flourishing throughout harvest and a period of recession starting at the end of harvest.

Studies on the biotic potential of *S. nigra* under ambient conditions showed that the rate of increase may become as high as $22\times$ in the warm months. Such high rates of increase however were not observed from figures obtained during the census. This is thought to be due to low survival rates of immature stadia under field conditions.

9.2 Plant Protection—Scientific Officer, Miss I. Balluck

9.2.1 Insecticide Trials

9.2.1.1 Beans (Variety Long Tom)

Two new insecticides, Actellic 25 E.C. and Decis 2.5 E.C. were tried on beans at Barkly Experiment Station for the control of bean pests. Lannate was used as the standard insecticide.

Actellic is an organophosphorus compound containing pirimiphos methyl. It acts by contact, ingestion and fumigant action. It has low mammalian toxicity. The interval between application and harvest is 2 days.

Decis (common name Decamethrin) is a synthetic pyrethroid of low mammalian toxicity. It acts by contact and ingestion and is effective at very low dosages. Crops can be harvested within a few days of spraying.

The four treatments, viz. Actellic, Decis, Lannate and Control were tested in a randomized block design. There were four replicates. Each plot consisted of 200 plants.

The plants were treated at weekly intervals from the 2 leaf stage, at the recommended dosages and twice a week during harvest.

The plants were examined weekly for the presence of insects and assessment was made by comparing the yield of green pods and on the percentage of pods attacked by the pod borer. For assessment of attack on pods, 200 pods were sampled at each harvest.

The experiment was carried out twice, once in Winter (June to August) and once during the summer months December to January. The results are tabulated separately (Table 9.13 and 9.14).

9.2.1.2 In both trials, the yield of green pods is slightly higher in the plots treated with Decis. Decis also has very good control over the pod borer.

The bean fly *Melanoagromyza phaseoli* was found in very few cases both in the Summer and Winter trials. The leaf tier *Nacoleia praeteritalis* was observed only in the summer trial but to a negligible extent. Damage done by the pod borer *Maruca testulalis* was less severe in winter than in summer.

9.2.2 Observations on Tobacco

Decis was tried on Tobacco on a plot of about 500 plants at Richelieu Experiment Station Half of the plot was treated weekly since a fortnight after transplanting, while the other half was left as control. Assessment of the efficacy of the insecticide was done by examining the damage caused by larvae of the Tobacco budworm *Heliothis armigera* to the upper leaves of the plants, and by counting the number of larvae on a fixed number of plants (about 50) chosen at random.

Results are given in Table 9.15

Decis appears to have excellent control over *Heliothis* from the results obtained during the first 2½ months. Towards the end of the season, however, the infestation of *Heliothis* was less severe.

9.2.3 The flamboyant Pest

The leaf-hopper which is causing severe defoliation of the flamboyant trees since 1977 was described by Dr. Ghauri of the Commonwealth Institute of Entomology as *Cerneura delonixia*

Observations on the distribution and extent of damage by the surveys at Soreze, Beau Bassin, Medine, Quatre Bornes and Mon Choisy showed that very few cicadellids were present. The pest did not appear to have any adverse effect on the flowering of the trees and the flowers themselves were not attacked. During January—February 1978, there were a few trees moderately attacked at Mon Choisy, Soreze and an intense attack at Beau Bassin. The results of the surveys during March—April 1978, all over the island are tabulated in Table 9.16.

Natural enemies of the pest have not been observed at the time this report is being written (March—May 1979), the trees are being again severely affected by the Cicadellid.

The cicadellid was found to occur throughout the island, causing severe damage in certain localities, e.g. Quatre Bornes, Soreze, St. Julien—Constance, and Vacoas. In Reduit nearly all the trees were severely attacked while in the South where very few flamboyant trees are present (Baie du Cap, Bel Ombre, Chemin Grenier) there were only traces of attack.

Observations on other plants belonging to the same sub-family as the flamboyant tree (*Delonix regia*) were carried out but the cicadellid was found to be specific to *D. regia*. The following plants were examined:—*Caesalpinia pulcherrima*, *Parkinsonia aculeata*, *Cassia occidentalis*, *Caesalpinia sappan*.

9.2.4 *The Banna Leaf Roller*

A survey carried out on Banana plantations during period April to June showed that damage by the Banana leaf Roller *Erionota thrax* was very low. An average of 16% of the trees at Palma, Henrietta, Floreal, Souillac and 2% at Surinam were found to be attacked, but very few leaves on those trees were damaged. At Rivière des Anguilles, and Nouvelle France the traces of damage were negligible.

Parasites of *Erionota*, were not recovered.

TABLE 9.13

INSECTICIDE TRIALS ON BEANS (WINTER)

Treatment (insecticide)		Yield of green pods (Total of 4 repli- cates kg).	%Pods damaged by pod borer
Lannate 25% W.P	...	54.3	6.2
Actellic 25 E.C	...	57.0	12.2
Decis 2.5 E.C	...	58.2	2.9
Control	...	49.9	13.4

TABLE 9.14

INSECTICIDE TRIALS ON BEANS (SUMMER)

Treatment (insecticide)		Yield of green pods (Total of 4 repli- cates kg).	%Pods damaged by pod borer
Lannate 25% W.P	...	23.1	16.4
Actellic 25 E.C	...	19.5	22.3
Decis 2.5 E.C	...	24.1	6.0
Control	...	17.4	16.6

TABLE 9.15

OBSERVATIONS ON TOBACCO

Date	Volume of solution used (litres)	Treated		Control	
		No. of larvae (50 plants)	% Plants attacked	No. of larvae (50 plants)	% Plants attacked
19.10.78	...	4.5	NIL	14.6	NIL
26.10.78	...	5.	1	8.3	5
3.11.78	...	5.	3	4.2	9
9.11.78	...	6.	5	NIL	60
16.11.78	...	7.	7	NIL	89
23.11.78	...	8.	1	2.5	48
30.11.78	...	9.	—	—	—
7.12.78	...	9.	—	—	—
14.12.78		10.	4	6.7	9
21.12.78	...	10.	4	7.5	7
28.12.78	...	10.	NIL	17.1	1
5. 1.79	...	10.	NIL	3.8	NIL
11. 1.79	...	10.	NIL	4.6	NIL
18. 1.79	...	10.	NIL	3.3	1

TABLE 9.16

DISTRIBUTION OF THE FLAMBOYANT PEST AND EXTENT OF ATTACK
OF THE FLAMBOYANT TREES

Month	Locality	Extent of Attack					
		No. of trees examined	Free of attack	Traces-only a few insects present-attack not apparent	Moderate-About 10-20% of leaves attacked	Intense-20-50% of leaves attacked	Very severe about 50% of leaves attacked Trees appearing brown
March	Tamarin	50	4%	40%	24%	32%	0
	Black River						
	Quatre Bornes	72	0	5.6%	16.7%	47.2%	30.5%
	Soreze	143	0	10.5%	35%	37.8%	16.7%
	Mon Choisy	130	46.2%	27.7%	19.2%	6.9%	0
	Tombeau Bay	50	0	22.4%	77.6%	0	0
	Ste Croix	89	0	52.8%	22.5%	24.7%	0
	Terre Rouge						
	Arsenal						
	Solitude						
Triolet							
April	St. Julien	115	0	5.8%	16.9%	71.7%	5.6%
	Constance						
	Poste de Flacq	52	0	1.9%	28.9%	30.7%	38.5%
	Poste la Fayette						
	Q. Bornes	72	0	5.6%	16.7%	47.2%	30.5%
	P. Magnien	60	38.3%	56.7%	5%	0	0
	Plaisance						
	P. d'Esny	58	0	8.6%	10.3%	69%	12.1%
	Vacoas						
	B. Bassin	144	0	0	0.7%	16.7%	82.6%
	Rose Hill						
	B. River	201	0	39.8%	27.4%	19.9%	12.9%
	C. Noyale						
Le Mornes							

9.3 Project on control of fruit flies

ORSTOM EXPERT C. HAMMES

DIVISIONAL SCIENTIFIC OFFICER—J. MONTY

SCIENTIFIC OFFICER—S. I. BALLUCK

9.3.1 Ecology of Fruit flies

9.3.1.1 Species collected

Of the seven Trypetid species recorded in Mauritius, six have been collected during the year.

The most abundant species on fruits is the Natal fruit-fly *Pterandrus* which maintains itself all the year round. The Mediterranean fruit-fly, *Ceratitis capitata* is also present throughout the year, being most abundant December - January. *Pardalaspis cyanescens* is common on Solanaceae but well controlled on tomatoes by application of insecticides. Of the two species found on cucurbits, *Dacus cucurbitae* is the most abundant. While *D. cucurbitae* is found throughout the year, *Dacus ciliatus* is mainly obtained during the summer months.

Dacus d'emmerezi has been captured occasionally in sexlure traps in December 1978.

Ceratitis catoirei has not been recovered. The last two species are also rare in Reunion Island, occurring only in certain localities, in very small numbers.

9.3.1.2 Host plants and Annual sequence

Table 9.17 gives the annual sequence of major host-plants and different species of fruit fly present in the fruits.

TABLE 9.17

Annual Sequence of host-plants and fruit-fly species

	J	F	M	A	M	J	J	A	S	O	N	D
Avocado ...		PR	PR	PR								
<i>Persea americana</i> Bearnt					==	==	==	==				
Indian almond ...	PR	PR	PR	PR	PR	PR	PR	PR	PR	PR	PR	PR
<i>Terminalia catappa</i> L.	CC	CC	CC	CC	CC	CC	CC	CC	CC			CC
Loquat ...					PR	PR	PR	PR				
<i>Eryobotria japonica</i> Lind												
Coffee ...							PR		PR			
<i>Coffea arabica</i> L.						==	CC	CC	CC	==	==	==
Bullock's heart ...						==	==	PR	PR	PR	PR	
<i>Anona reticulata</i> L.												
Citrus ...							PR	PR				
<i>Citrus</i> sp.									==			
Guava ...	G...		PR	PR	PR	PR	PR	PR	PR	PR	PR	
<i>Psidium goyava</i> Raddi												
Chinese guava ...	G...	PR	PR	PR	PR	PR	PR	PR	PR			
<i>Psidium cattleianum</i> Sabine			CC	CC								
Jujubes ...						PR	PR	PR	PR			
<i>Ziziphus jujuba</i> Lamb					==			CC				
Jamalac ...	PR	PR	PR								PR	PR
<i>Eugenia malaccensis</i> L.												
Jamblong ...											PR	PR
<i>Eugenia jambolona</i> Lamb									==	==		
Jamrosat ...											PR	PR
<i>Eugenia jambos</i> L.								==				
Lucuma ...				PR	PR	PR			PR	PR		
<i>Lucuma nervosa</i>												
Litchi ...	PR											PR
<i>Nephelium litchi</i> Lamb												
Mango ...	PR	PR	PR							PR	PR	PR
<i>Mangifera indica</i> L.	CC											CC
Pawpaw ...												
<i>Carica papaya</i> L.								PR				
Peach ...	PR											
<i>Prunus persica</i> L.									PR	PR	PR	PR
Chillies ...	CC	CC	CC	CC	CC	CC	CC	CC	CC	CC	CC	CC
<i>Capsicum frutescens</i> L.												
Tomatoes and brinjalls	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
<i>Solanaceae</i>												
Cucurbitaceae	Dcu	Dcu	Dcu	Dcu	Dcu	Dcu	Dcu	Dcu	Dcu	Dcu	Dcu	Dcu
	Dci	Dci	Dci	Dci	Dci						Dci	Dci

PR : *Pterandrus rosa*

CC : *Ceratitis capitata*

PC : *Pardalaspis cyanescens*

Dcu : *Dacus cucurbitae*

Dci : *Dacus ciliatus*

== : fruits not affected by fruit-fly

It is confirmed that *P. rosa* is the dominant species on account of the variety of fruits it attacks, which allow it to maintain populations throughout the year. *C. capitata* is less frequent but can also maintain itself all the year round on plants such as chillies (*Capsicum frutescens* L.). Guava (*Psidium goyava* RADD) and Indian almond (*Terminalia catappa* L.) constitute an important source of *P. rosa*. The fruits of Indian almond are not used and they remain on the ground where the larvae obtain optimum conditions for the formation of pupae.

The tomato fruit fly, *Pardalaspis cyanescens* and the fruit flies of cucurbits, *Dacus cucurbitae* and *Dacus ciliatus* maintain themselves throughout the year on their respective host plants.

9.3.1.3 Relative Abundance of the two main species

In table 9.18, the relative abundance of *P. rosa* and *C. capitata* has been evaluated from different types of studies based on captures of flies from 3 methods:

(a) Trimedlure traps

(b) Sticky traps

(c) Collection of fruits

The relative abundance varies with the method used to capture flies. Best results were obtained from the trimedlure traps (see paragraph 9.3.3.3) which attract both species.

Results obtained with sticky traps and infested fruits are less significant. Sticky traps yield a higher % of *P. rosa* than trimedlure traps because they do not have long range attractive properties and are usually placed on bearing trees which are hosts of *P. rosa*. The collected fruits also gave higher yields of *P. rosa*.

Populations of *C. capitata* are at their highest in February and in October - November, that is, when the population of *P. rosa* is at its highest and its lowest point respectively. The rise in February corresponds to an increase in the absolute population of *C. capitata* due to an abundance of host fruits while the rise in October - November is a relative increase because *P. rosa* population is less dense due to scarcity of fruits. During this period, *C. capitata* is able to maintain itself on chillies and other small fruits.

However, populations of *P. rosa* are consistently more important than those of *C. capitata*.

TABLE 9.18

SEASONAL RELATIVE ABUNDANCE OF *PTERANDRUS ROSA* (PR)
AND *CERATITIS CAPITATA* (CC) EXPRESSED AS
% OF FLIES CAUGHT

	<i>Flies from Trimed- lure traps</i>		<i>Flies from Sticky traps</i>		<i>Flies from collected fruit</i>	
	PR	CC	PR	CC	PR	CC
January ...	91.2	8.8	92.7	7.3	68	32
February ...	66.3	37.7	100	0	98.9	1.1
March ...	82.4	17.6	100	0	90.3	9.7
April ...	80.9	11.2	97.4	2.6	99.3	0.7
May ...	76.3	23.7	97.5	2.5	99.99	0.01
June ...	79.83	20.17	97.3	2.7	99.6	0.4
July ...	71.19	28.81	80	20	98.8	1.2
August ...	83.42	16.58	86.48	13.52	99.45	0.55
September ...	81.98	18.02	100	0	99.63	0.37
October ...	67.40	32.60	100	0	96.55	3.45
November ...	69.59	30.41	100	0	98.55	1.45
December ...	83.73	16.27	88.43	11.47	95.1	4.9

TABLE 9.19

PRODUCTION OF *P. ROSA* IN THE LABORATORY

Month	Total eggs collected ml -	Mean % Hatch	Mean pupal Yield per 100 fertile eggs	Mean pupal yield per 100 eggs	% Fertility
January 1978	... 251.3	54.1	23.7	10.93	—
February	... 165.3	35.6	61.6	21.59	—
March	... 208.7	31.2	42.2	13.12	—
April	... 338.9	62.3	52.6	31.05	79.0
May	... 334.7	64.7	40.4	25.08	76.0
June	... 308.6	53.3	33.1	16.31	80.0
July	... 476.2	52.1	52.5	25.69	81.3
August	... 385.2	73.7	22.4	16.69	75.0
September	... 381	55.7	30.7	17.00	78.0
October	... 442.5	73.8	32.7	24.55	74.0
November	... 455	85.3	28.0	23.28	78.0
December	... 300.6	79.3	46.1	35.47	—

Note : (i) 1 ml of eggs = 14,000 eggs

(ii) All the eggs were not used for production of pupae

9.3.2 *Laboratory rearing of Pterandrus rosa*

The laboratory rearing of *Pterandrus rosa* on the artificial diet established in 1973 is being continued.

Table 9.19 gives the laboratory production for the year 1978. In October, the adult cages were gradually transferred to another room with better control of temperature and humidity. Light is a major factor in fruit-fly reproduction and it has been established that *P. rosa* mates only at dusk. The adult breeding room is therefore exposed to natural light. To ascertain whether the light in the new room was favourable, a sample of female flies from each group of cages was dissected twice a week to find out the percentage insemination.

The percentage hatch of eggs was also determined. Both records showed that the flies had adapted well to the conditions in the new room.

From table 9.19, it can be noted that the egg hatch improved during the last three months of the year. However the pupal yield remained low. It was observed that pupal yield was higher when egg hatch was low and decreased when egg hatch increased. The reason for this is attributed to the fact that the density of larvae per tray is too high when the egg hatch is high. Experiments are being carried out on the density of eggs to be seeded per tray for maximum pupal yield.

The variable results obtained during the year 1978 were mainly due to fluctuations in temperature and humidity in the larval room. Satisfactory yields can be expected when environmental conditions are improved through air-conditioning.

Attempts to maintain genetic diversity in the Colony were made by the periodical introduction of wild flies into the cages. However, it appeared that matings between wild flies and laboratory ones do not take place readily. This important aspect of the biology of the laboratory flies is being studied.

9.3.3 *Ecology of Pterandrus rosa*

9.3.3.1 Study of the Local Environment

The Natal fruit fly occupies two different types of environment in Mauritius:

(a) The orchard zones situated mostly in towns and villages where a large number of fruit trees are present and where the species of host plants and their density vary considerably.

(b) The chinese guava (*Psidium cattleianum*) zones in the uncultivated uplands which show great homogeneity and cover vast areas. Large populations of *P. rosa* develop in these zones at the fruiting season of guava.

A detailed survey of fruit trees has been carried out to determine the importance of backyard gardens in the local environment.

Figure 9.1 illustrates the surfaces occupied by the zones where the Natal fruit fly can develop on the island. These zones are distributed throughout the island and any locality is exposed to visits by *P. rosa*. The chinese guava zones occupy about 10% of the area of the island while the orchard zones occupy another 10%.

Figure 9.2. shows the distribution of dominant fruit trees in various localities. A number of zones may be differentiated:

- a chinese guava zone.
- a coastal zone where Indian almond and mango trees are dominant. On the dry west coast jujube trees are also present in large numbers.
- An important part of the island, consisting of built-up areas in the lower regions where mangoes and avocado are abundant.
- Finally the central plateau zone which comprises the higher regions where avocado, guava and jamalac trees are dominant.

Figure 9.3 indicates the occupation of soil by fruit trees in the various biotopes. The percentages have been evaluated when each locality was being surveyed. They comprise all fruits susceptible to contain larvae of *P. rosa* and *C. capitata*.

9.3.3.2. *Evaluation of P. rosa attacks on fruits*

9.3.3.2.1. *Collection of fruits*

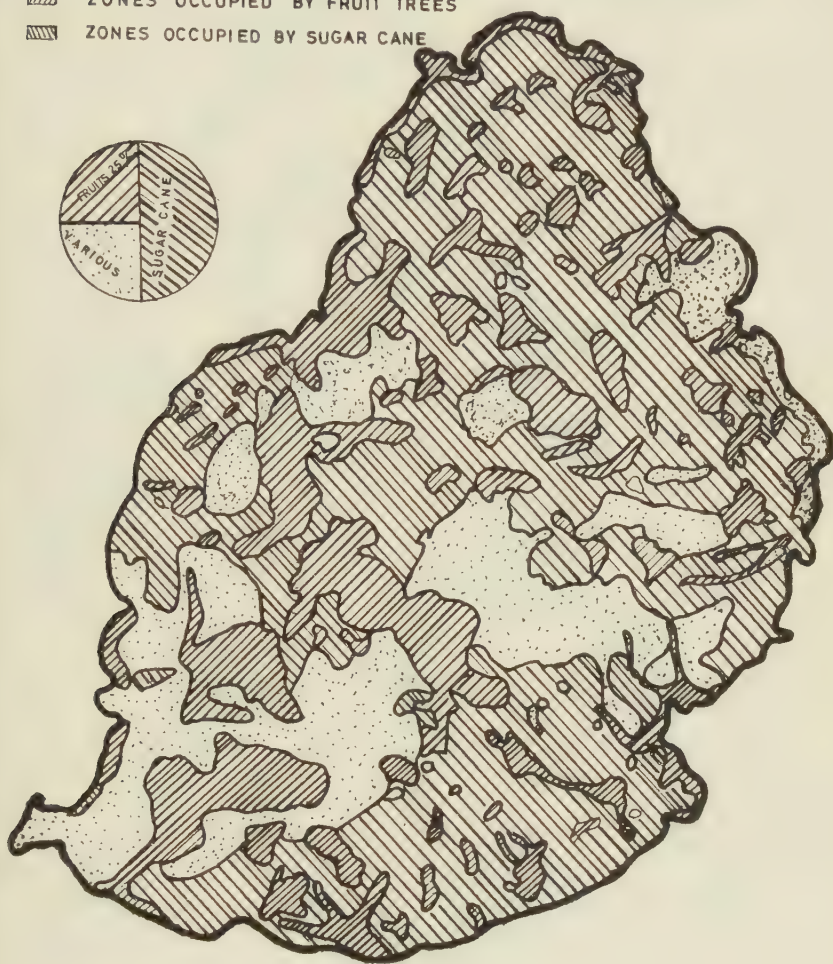
Collection of fruits is being systematically carried out since last year. The fruits are placed in trays in the laboratory and provide information on the presence or absence of flies in the fruits enabling determination of the number of pupae present in each type of fruit (Table 9.20).

SOIL OCCUPATION IN MAURITIUS

FIG. 9.1

/// ZONES OCCUPIED BY FRUIT TREES

\\\\\\ ZONES OCCUPIED BY SUGAR CANE



DISTRIBUTION OF DOMINANT FRUIT TREES IN MAURITIUS

FIG. 9.2

-  *PSIDIUM CATTLEIANUM* CHINESE GUAVA
-  *PSIDIUM GUYANA* GUAVA
-  *TERMINALIA CATAPPA* INDIAN ALMOND
-  *ZIZIPHUS JUJUBA* JUJUBE
-  *MANGIFERA INDICA* MANGO
-  *PERSEA AMERICANA* AVOCADO
-  *EUGENIA JABUEA* JAMALAC



FIG 9.3

RELATIVE IMPORTANCE OF AREAS WITH FRUIT TREES



TABLE 9.20

Average number of fruit fly pupae per fruit

	<i>Avocado</i>	<i>Indian almond</i>	<i>Loquat</i>	<i>Coffee</i>	<i>Citrus</i>	<i>Bullock's heart</i>	<i>Coq du levant</i>	<i>Sweet guava</i>	<i>Chinese guava</i>	<i>Jamalak</i>	<i>Jamrosat</i>
September 1977	...	3.73	—	0	—	11.7	—	—	—	—	0
October	...	4.31	—	0	—	31.4	—	—	—	—	0
November	...	0.80	—	0	—	16.0	—	—	—	0.07	0.11
December	...	0.63	—	0	—	—	—	7.3	—	0.28	0
January	...	0.34	—	0	—	—	—	3.0	—	0.35	—
February	0.03	0.48	—	0	—	—	0	3.0	—	0	—
March	0.16	0.72	—	0	—	—	0	3.98	0	0.08	—
April	0.75	1.3	—	0	—	—	0	3.33	0.03	0	—
May	0	3.4	0.72	0	0	—	0.17	0.65	0.06	—	—
June	0	2.87	0.60	—	0	—	0.12	1.88	0.12	—	—
July	0	2.55	0.95	0.29	0.16	0	—	0.37	0.08	—	—
August	0	4.40	1.81	0.04	0.13	8.5	—	3.43	0.29	—	—
September	—	10.01	0.88	—	0	5.04	—	—	0.38	—	—
October	—	5.80	—	0.07	—	10.93	—	0	—	—	—
November	—	0.26	—	0	—	13.0	—	4	—	—	0.22
December	0	0.42	—	0	0.02	—	—	—	—	0.02	—

TABLE 9.20—continued

	<i>Lucama</i>	<i>Mangoes</i>	<i>Jujubes</i>	<i>Mangous- tan</i>	<i>Pawpaw</i>	<i>Peach</i>	<i>Chillies</i>	<i>Pear-apple</i>	<i>Sapote</i>	<i>Spongias nombin</i>	<i>Litchi</i>
September 1977	12.7	—	—	0.04	0	0.01	0	—	0.6	—	—
October	4.03	0	—	0	0	1.0	—	—	1.8	—	0
November	0	0.45	—	0	0	0.88	—	—	0	—	0
December	—	0.09	—	—	0	1.10	—	0	0	—	0.01
January 1978	—	0.96	—	—	0	0.40	—	0	—	—	0.02
February	—	1.45	—	—	0	—	—	0	—	0	—
March	—	0.01	—	—	0	—	—	0.05	—	0	—
April	0.07	—	—	—	0	—	—	0	—	0.17	—
May	1.40	—	0.03	—	0.0	—	—	—	—	0.12	—
June	1.6	—	0.01	—	0	—	0.06	—	—	—	—
July	0	—	0.01	—	0	—	0.14	—	0	—	—
August	—	—	0.05	0	0.33	—	—	—	0	—	—
September	—	—	0.23	0	0	0.04	0.09	—	—	—	—
October	—	0	—	0.08	0	0	0.23	—	—	—	0
November	—	—	—	0	0	2.71	0.13	—	—	—	0
December	—	1.08	—	—	—	1.82	0	—	2.29	—	0.02

No flies were obtained from fruits such as pineapple, bilimbi, cashew nut, carambole and custard apple. Fruits such as citrus and pawpaw only occasionally contained larvae.

Fruits which yielded most pupae were bullock's heart, Indian almond, peach and guavas. A large number of pupae was also obtained from mango, loquat, and avocado (ripening fruits only).

Very few pupae were obtained from litchi and jujube.

From an economic point of view, the most damaged fruits are bullock's heart, guava, peach and mango. As far as insect populations are concerned, the fruits which are most important on account of their abundance are Indian almond, chinese guava, mango and guava.

9.3.3.2.2 *Economic Importance of P. rosa*

When assessing the economic importance of the Natal fruit-fly, all fruits yielding at least one fruit-fly pupa must be considered as non-edible.

The economic importance of *P. rosa* was assessed by keeping fruits individually in cups and observing the proportion of fruits giving rise to *P. rosa*. Results are summarised in Table 9.21.

A marked difference can be observed between the average number of pupae per fruit (Table 9.20) and the actual number of pupae per attacked fruit (Table 9.21). Usually there is more than one pupa per attacked fruit and the results obtained could be used ultimately to estimate the economic importance of attacks on different fruits.

The fruits which have mostly been attacked are Indian almond, guava and peach. Infestation of chinese guava is very slow and it is only towards the end of the fruiting season that more than 60% of the fruits are attacked. In chinese guava, the yellow variety is more susceptible than the red one mainly because of its fruiting season which occurs after that of the red variety. Fly populations are relatively high at the end of the fruiting period of red guava and damage the yellow guava extensively.

TABLE 9.21

Observation on fruit-flies emerging from fruits kept individually

Fruit	Month	Relative abundance of flies emerging from fruits		% Fruits containing <i>P. rosa</i> and <i>C. capitata</i> in some fruit	Mean No. of Pupae per fruit	% Fruit containing Pupae	Mean No. of Pupae of attacked fruit
		<i>P. rosa</i>	<i>C. capitata</i>				
Indian Almond	September 1977	100.0	0	0	3.07	37.0	8.29
	March 1978 ...	91.3	8.7	4.0	4.7	82.0	5.73
	April ...	92.5	7.5	2.0	0.63	25.0	2.52
	June ...	98.7	1.3	2.07	4.49	60.34	7.43
	July ...	98.6	1.4	0.77	5.62	62.3	9.01
	August ...	100.0	0	0	4.88	76.0	6.42
	September ...	100.0	0	0	8.18	72.0	11.36
	October ...	99.8	0.2	4.0	25.28	100.0	25.28
Chinese Guava	March 1978 ...	100.0	0	0	0.77	34.7	2.23
	April ...	100.0	0	0	0.14	9.0	1.50
	May ...	100.0	0	0	0.075	7.0	1.29
	June ...	100.0	0	0	0.64	35.0	1.83
	July ...	100.0	0	0	1.42	49.5	2.87
	August ...	100.0	0	0	2.60	64.4	4.04
Litchi	... November 1977	—	—	—	0.006	0.57	1.0
	December ...	—	100.0	0	0.04	6.0	1.33
	December 1978	100.0	0	0	0.08	8.0	1.0
Jamalac	... November 1978	98.0	2.0	0.8	0.85	41.6	2.04
	December ...	100.0	0	0	0.05	5.0	1.0
Mango	... November 1977	—	—	—	—	—	—
	December 77 ...	11.1	88.9	0	0.232	10.6	1.86
	January 1978 ...	100.0	0	0	0.06	2.86	2.0
	December 78 ...	100.0	0	0	4.20	30.0	14.0
Peach	... November 1977	100.0	0	0	1.15	64.1	1.80
	December ...	100.0	0	0	2.23	100.0	2.23
	January 1978 ...	100.0	0	0	2.11	100.0	2.11
	September ...	—	—	—	—	—	—
	October ...	100.0	0	0	0.20	0.013	15.0
	November ...	99.8	0.20	4.0	5.01	52.8	9.48
	December ...	100.0	—	—	0.54	9.30	5.62

9.3.3.2.3 *Percentage Emergence from Pupae* (Table 9.22)

The emergence of flies from fruits is shown in table 9.22. It does not appear that the emergence is affected by season. The eclosion is around 75% except for fruits which decay rapidly in the laboratory (Bullock's heart, mango etc.).

9.3.3.3 *Traps*

(a) *Sticky traps*

This study was discontinued as from June because of lack of glue. The results obtained with these traps are less significant than those obtained with sex-lure traps. Their use as a method of control could bring an improvement in the protection of fruits because they can attract females away from fruits.

(b) *Sex-lure traps*

This study started in January 1978. Based on the Steiner model, the traps are locally made from plastic containers which are quite inexpensive. The attractant used is trimedlure which attracts both males of *P. rosa* and *C. capitata*. The range of activity of trimedlure does not seem to exceed the canopy of a tree of normal height.

Results obtained in each locality are summarised in Table 9.23.

As far as relative abundance of *P. rosa* and *C. capitata* is concerned, *P. rosa* represents 80% of the captures, though certain variations occur during the year. The number of flies caught in January, February and March is much higher than in the other months of the year. In the West, *C. capitata* is dominant in Winter (June, July). This can be explained by the low population of *P. rosa* in the orchard zones at this time of the year when few fruits (such as masson, loquat and Indian almond) are available.

TABLE 9.22
Emergence of Pupae in collected Fruits Annual Mean per fruit

Avocado	75.60												
Indian almond	75.25												
Loquat	60												
Coffee	93.20												
Citrus	68.65												
Bullock's heart	30.29												
Cog du levant	72.60												
Sweet Guava	88.89												
Chinese guava	79.73												
Jujubes	45.58												
Jamalaç	69.68												
Lucuma	73.18												
Mangoustian	50.91												
Mangoes	50.91												
Peach	70.45												
Chillies	81.08												
Sapote	78.12												
Litchi	100												

Monthly Average from all Fruits

Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
88.56	65.05	86.83	80.28	73.95	77.58	71.92	59.87	62.98	74.08	60.04	75.57

TABLE 9.23

Captures of fruit flies in Trimedlure Traps
(Average number of flies caught per trap per month)

			<i>South</i>	<i>North</i>	<i>East</i>	<i>West</i>	<i>Plaines Wilhems</i>	<i>Moka</i>	<i>Chinese Guava Zones</i>	<i>Plateaux</i>
January	...	PR	11.50	4.67	24.33	300.86	10.5	0.5	—	—
		CC	57.25	12.67	19.00	39.43	3.25	2.0	—	—
		DC	0	0	0	0	0	0.5	—	—
February	...	PR	471.25	248.0	35.50	219.14	130.25	4.5	45	—
		CC	100.00	28.33	28.25	24.0	15.25	10.5	0	—
		DC	0	0	0	0	0	0	0	—
March	...	PR	279.50	13.33	5.0	56.43	48.6	3.0	21	—
		CC	24.25	23.33	2.0	33.43	9.8	3.5	0	—
		DC	0	0	0	0	0	0	0	—
April	...	PR	36.50	6.5	0.33	79.0	46.14	19.0	110	—
		CC	7.83	3.25	0	6.0	6.14	3.5	0	—
		DC	0	1.5	0	0	0	0	0	—
May	...	PR	15.33	18.5	5.20	135.50	237.71	1.0	270	—
		CC	11.67	6.75	1.80	76.50	28.14	7.0	1	—
		DC	0.17	0	14.80	0	0.14	2.5	0	—
June	...	PR	40.23	44.33	9.40	65.0	48.42	0	525	—
		CC	31.29	66.0	54.60	67.50	10.42	1.0	0	—
		DC	2.14	73.0	36.2	12.0	2.0	0	0	—
	...	PR	15.86	21.5	25.25	43.88	46.5	—	195	—
		CC	29.57	9.25	29.5	52.75	8.0	—	0	—
		DC	2.57	93.5	18.25	21.0	4.0	45.0	0	—
August	...	PR	9.14	20.80	37.00	87.12	34.83	45.0	361	—
		CC	3.86	5.0	36.75	26.25	15.38	34.5	0	—
		DC	0.86	33.8	16.25	14.0	8.5	2.5	0	—
September	...	PR	7.4	9.0	14.2	132.0	47.5	53.0	489.33	—
		CC	6.4	9.43	0.4	61.5	13.5	2.0	0	—
		DC	63.8	1.43	37.8	3.25	7.8	1.0	0	—
October	...	PR	3.0	3.86	12.6	132.5	54.3	13.7	529.33	—
		CC	11.8	71.71	15.8	97.0	18.1	1.7	0	—
		DC	20.8	2.86	22.0	18.75	3.0	0	0	—
November	...	PR	10.17	7.43	8.2	35.5	53.33	34	354.67	5.6
		CC	19.33	11.14	11.2	17.64	43.78	31.33	0.67	0.2
		DC	49.17	10.86	27.2	3.18	1.78	2.33	2.67	0
December	...	PR	4.43	17.10	7.5	149.59	70.17	13.33	297.33	20.4
		CC	21.86	33.70	5.25	9.54	34.25	4	0	0
		DC	15.43	63.0	22.25	8.18	2.92	0	2	1.4

PR = *Pterandrus rosa*CC = *Ceratitits capitata*DC = *Dacus cucurbitae*

Trapping of flies in the chinese guava zone was continued until December and was successful. This leads us to think that adult *P. rosa* can survive for several months. It is uncertain whether large migration of flies take place between the wild chinese guava zone and the built-up areas. It should also be noted that localised out-of-season fruiting of *Psidium cattleianum* was observed in December 1978.

Although *Dacus cucurbitae* is not reported to be attracted by trimedlure, variable numbers of the fly were found in the traps. *Ceratitis* flies on the other hand, were never caught in traps baited with cue-lure, an attractant specific to *Dacus* spp.

9.3.3.4 Sampling of pupae from the soil

Sampling of pupae from the soil constitutes a reliable method of measuring populations, as pupae can be readily collected in the soil under host trees. (Table 9.24).

In the village zone, pupae are not distributed evenly, and sampling of soil has to be carried out essentially under trees which bear fruits. Results therefore have to be readjusted according to many factors.

For Indian almond, sampling of pupae has been carried out throughout the year. For population studies Indian almond is important as the fruits being rarely eaten fall on the ground and the formation of pupae is not hindered. Moreover Indian almond has a fruiting period which is spread throughout the year with a maximum yield in Winter.

Very few pupae were collected in samples of soil under loquat and masson trees. This was to be expected for though masson has a high number of stings, the number of pupae per fruit is quite low. Loquat however, contains a high number of fruit fly larvae, but, as most loquat trees are found in courtyards where the ground is often swept, pupation may be disturbed.

TABLE 9.24

Soil Sampling of Pupae

Fruits	Month	Area (m ²)	No. of pupae collected		No. of pupae/m ²
			Emerged	Non-emerged	
Indian Almond	February	8	0	0	0
	March	6	0	4	0.66
	April	6	0	0	0
	May	8	0	31	3.9
	June	8	0	20	2.5
	July	10	0	6	0.6
	August	—	—	—	—
	September	8	2	2	0.25
	October	14	4	8	0.57
	November	8	2	1	0.13
	December	2	0	0	0
Guava	June	9.5	0	0	0
	July	6	0	0	0
	August	2	0	0	0
Jujubes	June	9.5	0	0	0
	July	16	0	0	0
	August	8	0	3	0.38
	September	6	0	0	0
<i>Psidium cattleianum</i>	March	6	0	0	0
	April	6	0	0	0
	May	30	0	7	0.23
	June	24	0	15	0.63
	July	24	0	63	2.63
	August	30	34	89	2.97
	September	18	2	4	0.22
<i>Psidium goyava</i>	May	6	208	203	33.8
	June	6	8	17	2.8
Peach	October	2	0	0	0
	November	8	7	83	10.4
	December	10	3	10	1
Mangoes	December	10	42	121	12.1
	January	20	4	126	6.3
	February	14	4	4	0.3

A great number of pupae is observed in samples under peach trees because peaches tend to fall on the ground before they reach maturity.

The observed small pupal populations under mango trees may be due to the fact that mangoes are popular fruits and are harvested before they are ripe.

Samples in the chinese guava zone give more accurate results because the zone is homogeneous and the harvest of fruits is not sufficient to disturb the equilibrium. Pupal population can be estimated directly from the samples. The number of pupae increases from April to August. In September the figure is lower because very few fruits remain on the guava trees. These guavas, however, show a high incidence of attack. It should be noted that two pupae per metre square corresponds to a high fly population, considering that the area occupied by the chinese guava zones is about 10% of the total area of the island.

9.3.3.5 Conclusion

The information gathered on the fruit-fly problems during the year confirm that the Natal fruit-fly is the most damaging species. It infests a wide range of fruits and because its host plants are scattered throughout the country, systematic control of the fly by pesticides is impossible.

The study has also revealed that the cucumber fly *Dacus cucurbitae* is also extremely abundant. The fact that cucurbits (squash, melons, cucumbers, etc) are freely available in the markets at low prices testifies to the excellence of control measures used by farmers. The most popular insecticides appear to be fenthion (Lebaycid), trichlorfon (Dipterex) and, tetrachlorvinphos (Gardona). The new synthetic pyrethroid insecticide decamethrin (Decis) has also proved to be very effective against fruit-flies.

During the surveys when hundreds of pupae were manipulated, the only parasite occasionally recovered was the Hymenopetran *Eucoila* sp. None of the natural enemies introduced at various times between 1958 and 1976 was recovered. It is concluded that biological and insecticidal control of the Natal fruit-fly in Mauritius is not feasible. If local fruits such as mango, guava, loquat, are to be made available to the public the Natal Fruit-fly must be controlled. The next stage of the research programme is therefore being aimed at the possibilities of eradication, using a combination of sex-lures, attractants and sterile-males.

9.3.6 Fruit Flies in Rodrigues

Report of Mission to Rodrigues from 27th November to 1st December 1978. (J. MONTY AND C. HAMMES).

Methods of Study

The only possible study of fruit flies which could be carried out in such a short period was the use of sex-lure traps. The attractants used were trimmed-lure and cue-lure and the traps were the same as those used in Mauritius.

Species Present

Three species were recovered in only four days:

Pterandrus rosa, the Natal fruit-fly

Ceratitis capitata, the Mediterranean fruit-fly

and *Dacus cucurbitae*, the cucurbit fruit-fly

In the short time available, it was not possible to establish whether the endemic species of the Mascarenes, *Ceratitis catoirei* and *Dacus d'emmerez* were present in Rodrigues. *Dacus ciliatus* was not caught in the cue-lure traps

Tomatoes, cultivated and wild egg plants contained a great number of Cryptid larvae which may be those of *Pardalaspis cyanescens*.

Brief Study of the Environment in Rodrigues

Rodrigues island is characterised by persistent droughts. In the last few years rainfall has been below average and serious water problems are being felt. Nevertheless most of the fruit trees present in Mauritius are also found in Rodrigues.

Some examples of cultivated fruits are mango, peach, masson, bullock's heart, citrus, jamlong and Jamalac.

Indian almond is quite abundant along the coast.

Moreover, many fruit trees grow wild in Rodrigues:

- Guava, *Psidium goyava* develops naturally in the east.
abundant in the humid regions on the central ridges of the island and in the South East.
- Guava, *Psidium, goyava* develops naturally in the east.
- Jamrosat, *Eugenia jambos* is abundant on the ridges and in the centre of the island.
- Ebony trees also bear fruits in Winter which are likely to be attacked by fruit flies.

If the sequence of these fruits is considered systematically, it is observed that, as in Mauritius the Natal and the Mediterranean fruit flies can easily maintain themselves throughout the year. However, the vegetation in Rodrigues is much more scattered and less dense than in Mauritius.

<i>Annual Sequence</i>	
<i>Summer Fruits</i>	<i>Winter Fruits</i>
Jamrosat ...	Chinese guava
Jamalac ...	Masson
Bullock's heart	Jamlong
Peach ...	Guava
Mango ...	Citrus
Guava ...	Indian almond
Indian almond	Mango (Late harvest)

Importance of Populations

The trappings carried out from 27th November to 1st December gave the following results :—

Locality	Date	Fruit	Number of Flies		
			<i>P.rosa</i>	<i>C. capitata</i>	<i>Dacus cucurbitae</i>
Port Mathurin	{ 27.11.78	Indian almond	7	—	4
	{ 29.11.78	Indian almond	12	1	3
	{ 30.11.78	Indian almond	7	—	2
	{ 1.12.78	Indian almond	9	—	—
Oyster Bay	... 29.11.78	Guava	13	1	36
Port Sud-Est	... 26.11.78	Citrus (Trimedlure)	—	—	17
	1.12.78	Cucumber (Cue-lure)	—	—	12
Total ...			48	2	64

These catches indicate that :—

1. In the Port Mathurin region (Port Mathurin and Oyster Bay), the three species most abundant in Mauritius are present.
2. *P. rosa* was not captured at Port Sud-Est. Therefore it cannot be confirmed whether *P. rosa* exists throughout the island.
3. The island received its fruit-fly (*P. rosa*) infestations from Mauritius and that these importations, up to now seem to be restricted to the cultivated Zones around Port-Mathurin.
4. Populations of *Dacus cucurbitae* seem to be very abundant in the various biotopes where traps were placed. Very few cucurbit cultivations were present in Rodrigues at this period of the year. It should be considered whether *Dacus cucurbitae* can develop on other plants. This has to be investigated thoroughly in Rodrigues as up to now *Dacus cucurbitae* was believed to be specific to cucurbits.

9.4 Sericulture Section—(A. JOOMAYE)

9.4.1 Moriculture

9.4.1.1 Sericulture project at Dubreuil and Vuillemin

After long official negotiations with the Tea Development Authority and Development Works Corporation regarding the sericulture project at Dubreuil and Vuillemin, authority was obtained to implement it in November 1978. Land preparation, for the establishment of 25 acres of mulberry at the above-mentioned areas, was under the responsibility of the Development Works Corporation. Works started at Vuillemin Tea Village in November of last year and by the end of 1978, one acre of land was cleaned and made ready for plantations.

9.4.1.2 *Nouvelle Découverte*

During the year, an area of 4½ acres was planted as programmed, bringing the total area of mulberry there to about 10 acres.

A mulberry nursery has been established to provide saplings to existing plantations and to farmers. A total of 36,426 cuttings were planted under nursery during the year. Mr. R. Brizmohun, Technical Officer joined the section in May 1978. His main assignment was to study the agronomical aspects of mulberry.

The policy to provide farmers with young stage larvae has necessitated the rearing of the first two stages of silkworms on our stations. For this purpose, it is essential to have special fields set apart for producing only tender leaves. An attempt was made to study the yield of tender leaf that could be obtained from a unit area by controlled prunings. Data obtained were insufficient to draw any conclusion and the study will have to be continued in 1979.

9.4.2 *Silkworm rearing*

9.4.2.1 *Pure races*

The 5 pure races designated as M1, M2, M3, M4 and M5 were reared at the Reduit Laboratory for the maintenance of the pure stock and for the preparation of hybrid silkworm eggs. During the period under report, 14 disease free layings (DFL) were reared in 14 crops producing a total of 49.85 kg of cocoons. The yield of cocoon per 100 DFL averaged to 60.35 kg. The yield calculated on the basis of 10,000 larvae brushed, worked out to be 14.8 kg. These results are highly satisfactory. The average number of cocoon per kilogram was found to be 589 indicating the high quality cocoon produced.

9.4.2.2 *Hybrid rearing*

Rearings of different combinations of the pure stock races were continued at the Curepipe station only. Rearings on other stations were discontinued due to financial constraint. Curepipe station reared 178 DFL and harvested 2.5 kg of cocoon. The average yield of 46.3 kg per 100 DFL was obtained for the year. This result is satisfactory, but could be improved with better rearing facilities.

9.4.3 *Seed Production*

In the five stock races of M1, M2, M3, M4 and M5, 3,357 cocoons were selected to prepare 1,173 layings of the five pure races. Another 3,310 cocoons were used for the preparations of 18,091 hybrid layings of various combinations. The percentage yields of layings obtained from cocoon were 34.9 for pure race and 33.9 for F₁ crosses.

9.4.4 *Rearing by private rearers*

During the year under report, 2,623 DFL were reared up to second stage at Reduit and Curepipe and supplied to 17 rearers. They produced 975.78 kg of hybrid cocoons averaging 37.2 kg per 100 DFL. This is slightly lower than the expected yield of 40kg per 100 DFL for field rearings. This was mainly due to slight incidence of muscardine disease and lack of sufficient experience on the part of new rearers.

9.4.5 *Extension*

During the year, 78 new persons registered their names under the sericulture project. All were contacted and 11 of them planted an area of about 4 acres, using 40,500 cuttings supplied freely by the Sericulture Section of the Entomology Division. Another 3,200 cuttings were supplied to several farmers for recruiting purposes. The Ministry of Agriculture paid a sum of Rs 19,495 to farmers for the purchase of 975.775 kg of cocoons produced by them.

X. AGRICULTURAL CHEMISTRY DIVISION

HEAD OF DIVISION: L. C. LAM THUON MINE—DIVISIONAL SCIENTIFIC OFFICER
N. COONJAN — SCIENTIFIC OFFICER

10.1 *Soils*

10.1.1 19 samples of soils collected from various small planters' fields by the officers of the Extension Service Division were analysed for pH, N, P, K, and one of them was also analysed for calcium, magnesium and molybdenum. The aim was to assess their fertility status in order to recommend appropriate fertilizer application to the planters.

10.1.2 An ecological study on "Le Petrin Nature Reserve" carried out by the Forestry Department necessitated the analysis of soil. Table 10.1 indicates the average values for the analyses of 6 samples of soil.

TABLE 10.1

ANALYSIS OF SOIL FROM "LE PETRIN NATURE RESERVE"

pH	...	3.8
Nitrogen	...	0.71%
Total phosphorus	...	466.7 ppm
Available phosphorus...	...	140.7 ppm
Potassium	...	0.27 me/100g soil
Organic matter	...	5.46%

10.1.3 78 samples of soils, related to the studies on bacterial wilt strain variation, were received from the Plant Pathology Division for the determination of their water holding capacity or humidity.

10.1.4 The Ministry of Fisheries submitted 13 samples of soil for the determination of pH, nitric nitrogen, available phosphorus and organic carbon. These were in connection with their polyculture experiments carried out at Medine and St. Antoine, involving Indian Carps, Chinese Carps and Giant Prawns "*M. Rossenbergii*" in various species combinations, stocking densities, feeding and fertilization regimes. The results obtained are given in table 10.2.

TABLE 10.2

ANALYSIS OF SOILS FROM MEDINE AND ST. ANTOINE

<i>Locality</i>		<i>Pond No.</i>	<i>pH</i>	<i>No₃-N (ppm)</i>	<i>Available P (ppm)</i>	<i>Organic Carbon (%)</i>
Medine	...	1	7.3	4.65	22.4	0.63
		2	7.5	0.86	44.0	0.82
		3	7.4	1.15	48.0	0.78
		4	7.5	0.90	30.4	1.02
		5	8.1	6.88	34.0	1.50
		6	7.6	2.30	34.0	1.35
St Antoine	...	3	7.4	0.19	58.9	1.47
		5	7.3	0.47	97.5	1.63
		6	7.4	0.30	62.3	1.25

10.1.5 In relation to the experiments conducted by the Agricultural Division, 282 samples of soils were received and analysed. The details are presented in table 10.3.

TABLE 10.3

DETERMINATIONS ON SOIL SAMPLES RELATED TO VARIOUS EXPERIMENTS

<i>Location</i>		<i>Experiment</i>		<i>No. of Samples</i>	<i>Determination</i>
F.U.E.L.	...	Rice Variety Trial	...	2	pH, N; P, K
Central Experiment Station		Manioc Observational trial	...	1	pH, N, P, K, O.M*
Central Experiment Station		Fertilizer trial on lettuce	...	1	pH, N, P, K, O.M*
Central Experiment Station		Cowpea variety trial	...	3	pH, N, P, K, O.M* C.E.C†
Curepipe Experiment Station		Cowpea variety trial	...	4	pH, N, P, K, O.M* C.E.C†
Curepipe Experiment Station		Strawberry observational trial		2	pH, N, P, K, O.M*
Curepipe Experiment Station		Sugarbeet observational trtal		2	pH, N, P, K, O.M*

TABLE 10.3—*continued*

<i>Location</i>	<i>Experiment</i>	<i>No. of samples</i>	<i>Determinations</i>
Pamplermousses Experiment Station	Fertilizer trial on lettuce	12	pH, N, P, K, O.M.*
do	International Soybean variety Evaluation	4	pH, N, P, K, O.M.*
Plaisance Experiment Station	Fertilizer trial on onion	4	pH, N, P, K, O.M.*
do	Fertilizer trial on garlic	4	pH, N, P, K, O.M.*
Richelieu Experiment Station	Fertilizer trial on tobacco	4	pH, N, P, K, O.M.*
Wooton Experiment Station	To determine the biological and economic optimum rate of nitrogen application at two levels of P and K	26	pH, N, P, K, O.M.* C.E.C†
do	To determine the effects of different rates of nitrogen application on the yield of tea at different levels of P and K	25	pH, N, P, K, O.M.* C.E.C†
do	To determine the uptake of phosphorus by tea plants applied in the form of triple super-phosphate in the presence of different types of mulch	180	pH, P

10.16 8 samples of soil were received from the Chinese Agricultural Team for the determination of pH, organic matter and total soluble salts.

10.2 *Livestock Effluent*

One sample of livestock effluent received from the Agricultural Division was analysed in order to assess its fertilizer value. The results on a dry matter basis are shown in table 10.4.

TABLE 10.4

ANALYSIS OF LIVESTOCK EFFLUENT

Dry matter	...	...	5 %
Total phosphoric acid	...	...	3.71%
Total potash	...	...	3.60%
Total nitrogen	...	...	1.57%
Organic matter	...	...	82.50%

* Organic matter

† Cation Exchange Capacity

10.3 Water

10.3.1 In connection with the experiments carried out by the Ministry of Fisheries as mentioned in 10.1.4, 95 samples of water collected from various ponds at Medine, St. Antoine and Jurancon were received and analysed for nitrate content. The data obtained are shown in table 10.5.

TABLE 10.5

MEAN NITRATE CONTENT (NO_3^-) IN VARIOUS PONDS AT DIFFERENT LOCALITIES

Locality	Pond No.	No. of samples	Mean $\text{No.}_8\text{-ppm}$
Medine	...	1	12
	2	4	0.72
	3	15	0.58
	4	15	2.41
	5	4	0.76
	6	2	0.67
St. Antoine	...	3	0.40
	5	14	0.75
	6	13	0.48
Jurancon	...	6	0.87
	1	2	0.33

10.3.2 One sample of water was received from the Ministry of Fisheries for the determination of pH, phosphate, total alkalinity and total hardness.

10.3.3 One sample of water sent by the Agricultural Division was analysed for potassium.

10.3.4 Six samples of water were received from Doger de Spéville and Co. Ltd., two of which were analysed for total dissolved solids, total undissolved solids and sodium chloride, and the other four for pH, conductivity, resistivity, calcium, magnesium and iron.

10.4 Miscellaneous Analyses

Some odd samples from other Divisions of the Ministry and the private sector were also analysed. The details are given in table 10.6.

TABLE 10.6

ANALYSIS OF VARIOUS SAMPLES

<i>Source</i>	<i>Samples</i>	<i>No. of Samples</i>	<i>Determinations</i>
Agricultural Division ...	Different mulches	8	moisture
do	Farmyard manure	1	pH, N, P ₂ O ₅ , K ₂ O
Cane Planters and Millers	Molasses	1	N, P ₂ O ₅ , K ₂ O
Arbitration and Control Board			
Entomology Division ...	Sand	2	chloride
Extension Service Division	Farmyard manure	1	pH
Private Estates ...	Dipping bath	6	As ₂ O ₃
Private Estate ...	Boiler scales	9	CO ₃ , Cl, PO ₄ , SO ₄ , Ca, Mg, Fe

N. COONJAN ... SCIENTIFIC OFFICER

N. N. RAMANJOOLOO ... SCIENTIFIC OFFICER

10.5 Fertilizers

28 samples of compound fertilizers were received from various sources for formulation check. The chemical determinations carried out are indicated in table 10.7. Moreover, visits were effected to Mauritius Chemical and Fertilizer Industry Ltd. (MCFI) to assist the sampling process during the bagging of the fertilizers for export. In this connection, one sample of fertilizers was retained for analysis.

TABLE 10.7

ANALYSIS OF FERTILIZERS FROM VARIOUS SOURCES

Sources	No. of Samples	Determinations
Extension Service Division ...	3	NH_4^+ , SO_4^{2-} , impurities
do	4	N, P_2O_5 , K_2O , H_2O
do	1	N, P_2O_5 , K_2O , MgO
Forensic Science Laboratory ...	1	N, P_2O_5 , K_2O
MCFI ...	4	N, P_2O_5 , K_2O , MgO
do	11	N, P_2O_5 , K_2O
do	1	N, $\text{NH}_4\text{—N}$, P_2O_5 , citric acid soluble P_2O_5 , K_2O
Savannah S.E. ...	1	N, P_2O_5 , K_2O
Mon Desert Alma S.E. ...	2	N, P_2O_5 , K_2O
do	1	citric acid soluble P_2O_5

10.6 Tea Leaves

10.6.1 In connection with the experiment started by the Agricultural Division at Wootton Tea Experiment Station in October 1976 to study the uptake of phosphorus by tea plants applied in the form of triple super-phosphate in the presence of different types of mulch such as bagasse, sawdust, tea waste and dry litter coming from pruning, tea leaves were collected regularly at monthly intervals during 1978 for analysis. This experiment scheduled to last over a period of 6 years requires the following determinations

- (i) Top 4-inch soil pH
- (ii) Total phosphorus content in the bud and first leaf and in the third leaf
- (iii) Available phosphorus in the top 4-inch soil.

352 samples of tea leaves were collected during the year and analysed for total phosphorus. The results obtained are summarized in table 10.8. 180 samples of soil were also collected and analysed—see under soil section 10.1.5.

TABLE 10.8

THE MONTHLY MEAN PHOSPHORUS PERCENTAGES IN TEA LEAVES ON A DRY MATTER BASIS (D.M.) IN THE PRESENCE OF DIFFERENT TYPES OF MULCH

<i>Mulch</i>		% Phosphorus (D.M.)	
		<i>1st leaf</i>	<i>3rd leaf</i>
Control	...	0.48	0.34
Bagasse	...	0.48	0.34
Sawdust	...	0.49	0.35
Tea Waste	...	0.48	0.35
Tea litter	...	0.48	0.35

The results were similar to those obtained in 1977 and again showed that tea did not respond to greater absorption of phosphorus in the presence of different types of mulch.

N. N. RAMANJOOLOO ... SCIENTIFIC OFFICER

10.6.2 The small leaf analysis survey carried out on the representative field 6 (ex. field 3) at Wootton Experiment Station as from January 1976 was continued for the year 1977. The analysis of tea leaves was completed in early 1978. The data obtained will provide a general idea of the leaf nutrient levels to be expected throughout the year in healthy tea in Mauritius and at the same time a basis for comparison in the interpretation of results of analyses of unhealthy or low yielding tea.

A summary of the results of samples collected throughout 1977 is presented in table 10.9 and illustrated in Figures X.I., X.II and X.III.

TABLE 10.9

MEAN MONTHLY PERCENTAGE OF N, P, K IN 1ST, 2ND AND 3RD LEAF ON A DRY MATTER BASIS (FOR 1977)

<i>Month</i>		<i>1st leaf</i>			<i>2nd leaf</i>			<i>3rd leaf</i>		
		%N	%P	%K	%N	%P	%K	%N	%P	%K
January	...	5.18	0.48	1.76	3.80	0.39	1.81	3.38	0.33	1.83
February	...	5.04	0.49	1.71	4.10	0.40	1.81	3.42	0.35	1.78
March	...	5.56	0.51	1.75	4.65	0.42	1.79	3.72	0.37	1.77
April	...	4.92	0.54	1.77	4.14	0.45	1.84	3.35	0.39	1.78
May	...	4.55	0.55	1.70	3.54	0.44	1.75	3.28	0.39	1.72
June	...	4.75	0.52	1.69	3.74	0.43	1.74	3.30	0.37	1.66
July	...	4.36	0.53	1.60	3.54	0.43	1.65	3.01	0.37	1.53
August	...	4.71	0.51	1.58	3.48	0.41	1.57	3.06	0.35	1.48
September	...	4.32	0.55	1.59	3.60	0.43	1.65	2.81	0.32	1.62
October	...	4.82	0.63	1.67	3.64	0.49	1.66	3.23	0.36	1.71
November	...	4.29	0.55	1.59	3.45	0.40	1.69	2.60	0.30	1.66
December	...	4.23	0.52	1.50	3.30	0.38	1.58	2.73	0.30	1.60

10.6.3 The following factors were taken into account in interpreting the variability of N, P, K in tea leaves.

(i) *Fertilizer Regime*

In 1977, fertilizer treatments were applied to Field 6 in 2 splits—one in mid-February and the other one in mid-September. Each split consisted of 185 lb of the complex mixture 25-5-12 per acre equivalent to 46.3 lb N, 4 lb P and 18.4 lb K per acre.

(ii) *Rainfall*

The maximum rainfall at Wooton Experiment Station was recorded between January and April 1977 with a monthly mean of 14.6 inches and the minimum rainfall from June to November 1977 with a monthly mean of 4.7 inches

(iii) *Yield of green leaf*

Table 10.10 shows that the highest yield of green leaf was in April and October 1977 when optimum conditions prevailed, viz: fertilizer application in February and September, adequate rainfall and favourable temperature. The yield dropped significantly during the winter period. The trend was more or less similar to that in 1976.

TABLE 10.10

MONTHLY YIELD OF GREEN LEAF IN THE REPRESENTATIVE PLOT
(0.3 ARPENT)

Month	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Yield (kg) ...	209	130	187	222	101	91	29	50	Nil	200	63	151

10.6.4 *N, P, K variation in tea leaves*

(i) *Nitrogen*

As shown in Figure X.I., at any moment of the year nitrogen content in a pluckable shoot increased progressively from the third to the second and to the first leaf with a monthly mean of 3.16%, 3.75% and 4.73% respectively. It reached a first peak in March following the first fertilizer application in February and a second peak in October after the second fertilizer application in September. The seasonal variation of nitrogen content was observed to be the same in each leaf along the shoot. The pattern was similar to that found in 1976, except that in 1976, the higher nitrogen peak was obtained in October whereas in 1977, it was in March.

(ii) *Phosphorus*

Figure X.II shows that the pattern of phosphorus content in each leaf along the shoot was also similar to that in 1976. The monthly mean of phosphorus was 0.35%, 0.42% and 0.53% in the third, second and first leaf respectively. Two peaks were again obtained after fertilizer application—higher one in October and a lower one in April, but they were the other way round in 1976, i.e., the higher one in April and the lower one in October.

(iii) *Potassium*

Figure X.III indicates that the pattern of potassium content in each leaf along the shoot was again different from that of nitrogen and phosphorus. No definite orderly progression was shown although the second leaf contained the highest level of potassium for almost all the year round. The monthly mean for the first, second and third leaf was 1.66%, 1.72% and 1.68% respectively. Two peaks were obtained—the first one in April and the second one around October and November after the two fertilizer applications in February and September.

Although some similarities were observed in tea leaves collected in 1976 and 1977 as far as their major nutrients were concerned, there are still some other factors to be determined. The survey will have to be carried out for at least another two years before any final conclusion could be drawn.

A. H. MOHUNGOO — SCIENTIFIC OFFICER

10.7 *Feeds and Fodder*

10.7.1 Raw materials for the manufacture of animal feeds were collected from livestock Feed Factory and analysed for one or more of the following: fibre, protein, fat and fluorine in order to establish the correct formulation. The prepared feed were then checked for their standards.

10.7.2 Local maize and molasses were regularly collected from livestock Feed Factory for the determination of moisture and degree brix respectively.

10.7.3 In connection with the experiment conducted by the Animal Production Division to study the effect of different retention times in the production of biogas from feedlot effluent, 84 samples of fresh and digested effluent were received for the determination of dry matter, nitrogen and organic matter.

10.7.4 The Animal Production Division started an experiment on the use of rumen defaunating agents for cattle growing on urea/molasses based diets. In this connection, samples of chopped whole sugarcane and fish meal were received for the determination of dry matter, protein, fibre, fat and ash, and those of molasses/urea for the determination of pH, dry matter, urea and brix.

10.7.5 In relation to the experiment set up by the Animal Production Division on the use of poultry litter in fattening diets based on molasses and bagasse for cattle, samples of poultry litter, fish meal and feed containing poultry litter were received for the determination of dry matter, protein, fibre, fat and ash.

10.7.6 In conjunction with the experiment carried out by the Animal Production Division to study the effects of various levels of fish meal in a molasses/urea and restricted forage feeding system on animal performance, samples of fish meal, fodder, maize, molasses and calf and cow feeds were received for the determination of dry matter, protein, fibre, fat or brix.

10.7.7 Samples of chipped sugarcanes and acacia were received from the Animal Production Division and analysed for dry matter, protein, fibre and ether extract. These were in connection with the experiment on the use of acacia forage in sugarcane based diets.

10.7.8 To compare the suitability of 8 grass species as a source of fodder, the Agricultural Division sent sample of grass after each cut for the determination of dry matter, protein and fibre.

10.7.9 In conjunction with the experiment on sugarcane as a potential source of animal feed—investigating the effects of different planting dates at monthly intervals on the yield of sugarcane—samples of sugarcane tops and stalks were received after each cut from the Agricultural Division and analysed for dry matter, protein and fibre.

10.7.10 3 samples of sugar beet leaves were received from the Agricultural Division and analysed for dry matter, protein, fibre and ash. The average results obtained on a dry matter basis are indicated in table 10.11.

TABLE 10.11

ANALYSIS OF SUGAR BEET LEAVES

Dry matter	...	8.1%
Protein	...	17.8%
Fibre	...	8.8%
Ash	...	17.8%

10.7.11 Samples of acacia in relation to the acacia spacing trial were received from the Agricultural Division. They were analysed for dry matter, protein and fibre.

10.8 *Miscellaneous Analyses*

Some odd samples from the other Divisions of the Ministry and the sector were also analysed. The details are given in table 10.12.

TABLE 10.12

ANALYSIS OF VARIOUS SAMPLES

Source	Samples	No. of samples	Determinations
Animal Production Division	Feeds	3	dry matter, protein, fibre
do	... Silage scum	4	dry matter, protein, fibre, fat
do	... Urea/molasses	4	pH, dry matter, urea nitrogen, brix
Plant Pathology Division	... Pseudomonas solanacearum suspensions	12	protein
Veterinary Division	... Water	1	urea
Mauritius Meat Authority	... Carcasse meal	1	dry matter, protein, fibre, fat
Private Sector	... Feeds	5	protein

L. C. LAM THUON MINE — DIVISIONAL SCIENTIFIC OFFICER

10.9 *Pesticide Residues*

10.9.1 A method was studied for residue analysis of tetrachlorvinphos in various crops. The method involves the extraction of the residues with a mixture of hexane and iso-propyl alcohol in the ratio of 3:1. The alcohol is removed from the extract by water wash and the residues are determined by gas chromatography using phosphorus nitrogen detector in the phosphorus mode. The 1-metre column packed with 3% OV-17 on gas chromosorb W-HP 80-100 mesh was quite suitable giving a recovery of $84\% \pm 11\%$.

Recovery tests were carried out by adding known amounts of tetrachlorvinphos to samples of various crops such as cabbage, lettuce, petsai, sweet pepper, tomatoes and leeks. Gas chromatographic conditions and results are indicated in table 10.13.

10.9.2 Spectrophotometric and gas chromatographic methods for determining residues of methomyl were studied. The spectrophotometric technique was not reliable for residue work as the recovery of methomyl from spiked samples of various crops was very poor. The measurement was made by converting methomyl to oxime and hydroxylamine by alkali and acid treatment respectively. Hydroxylamine was oxidised with iodine in the presence of sulphanilic acid to yield p-diazoniumbenzenesulphonic acid which was then coupled with 1-naphthylamine to form a crimson p-benzenesulphonic acid-azo-1-naphthylamine with an absorption maximum at 520 nm. However, this technique is suitable for formulation work as a good calibration curve is obtainable for the standard methomyl.

The gas chromatographic technique was found to be satisfactory using the 1-metre column packed with 10% FF AP on gas chromosorb W-HP 80-100 mesh and the flame photometric detector in the sulphur mode. This method is being applied to extracts of various crops and the experiment is still in progress.

10.9.3 Some recovery experiments were carried out by spiking various crops with malathion or azodrin. Gas chromatographic conditions and results are summarized in table 10.13.

TABLE 10.13
Recovery (%) of different pesticides added to vario crops obtained by GLC techniques

<i>Crop</i>	<i>Pesticide</i>	<i>Spiking level (PPm)</i>	<i>Mean recovery (%)</i>	<i>GLC Column and conditions used</i>
Cabbage	...	...	91.	1-metre glass column packed with 3% OV-17 on gas chromosorb W-HP 80-100 mesh at 205°C and 82 ml/min, PND in the 'P', mode at 650°C, injector temperature at 200°C
Lettuce ...	"	...	84.1	same column and conditions
Petsai ...	"	...	95.3	same column and conditions
Sweet pepper	"	...	83.1	same column and conditions
Tomatoes	"	...	73.5	same column and conditions
Leeks ...	"	...	82.5	same column and conditions
Brede de Chine	Malathion	...	97.4	2-metre glass column of 2% SE 30 + 0.3% QF-1 on gas chromosorb Q at 185°C and 21 p.s.i., PND in the 'P' mode at 650°C, injector temperature at 225°C
Lettuce ...	"	...	105.3	same column and conditions
Petsai	"	...	98.7	same column and conditions
Brede de Chine	Azodrin	...	63.2	2-metre glass column of 2% PDEAS on gas chromosorb Q 80-100 mesh at 200°C and 30 p.s.i., FPD in the 'P' mode injector temperature at 250°C and detector temperature at 250°C
Beans ...	"	...	60.0	same column and conditions
Rice ...	"	...	113.0	same column and conditions
Tomatoes	"	...	59.0	same column and conditions

10.9.4 During the year, some problems were encountered in the operation of the gas chromatograph. The performance of the electron capture detector was poor as the D.C. standing current went over full scale when the detector was heated. In this respect, advice was received from Perkin Elmer Ltd., the manufacturer, to cure the problem. Since there are four detectors for the gas chromatograph and only two can be functional at any one time, the equipment takes a very long time to stabilise to optimum working conditions when the detector is changed from one to another. In this connection, a second gas chromatograph was ordered to avoid the alterations to the electrical and pneumatic connections and attendant risk of damage to the instrument. This arrangement would provide one gas chromatograph permanently set up for electron capture detector work—mainly for organochlorines and derivatized carbamates and for flame ionisation detector analysis whereas the second one would be permanently set up for the determination of organophosphorus, organosulphur and some carbamates by either phosphorus nitrogen detector or flame photometric detector.

10.10 *Groundnut Cakes*

Groundnut cakes were collected monthly from Livestock Feed Factory and analysed for the presence of aflatoxin. No detectable level of aflatoxin was observed, except that very low levels of 0.04 ppm and 0.03 ppm were obtained in March and December 1978 respectively.

10.11 *Miscellaneous Analyses*

(i) Beans and tomatoes were collected from Barkly Experiment Station for the determination of methomyl and tetrachlorvinphos residues respectively.

(ii) 5 samples of water were received from the Ministry of Fisheries for the analysis of pesticide residues.

(iii) 2 samples of azodrin were received from the Entomology Division for formulating check.

(iv) 1 sample of cow feed was received from Mauritius Meat Authority for the detection of aflatoxin.

(v) 10 samples of citrus species were received from the Plant Pathology Division for the detection of gentisoyl glucose (greening disease).

(vi) 10 samples of tomatoes were received from the Plant Pathology Division for the determination of pH.

10.12 *Staff Movement*

(i) Back from his seven weeks' overseas leave, Mr. N. N. Ramanjooloo, Scientific Officer, resumed duty on 12th September 1978. He left on study leave on 26th September 1978.

(ii) Mr. S. Seeneevassen, Field Assistant, resumed duty on 14th September 1978 after having obtained his diploma in Agriculture and Sugar Technology at the University of Mauritius.

10.13 *New Laboratory*

Our work, which was disturbed in January and February 1978 when we moved to our new laboratory, was back to normal as from 1st March, 1978.

10.14 The following table shows the number of various samples analysed during the year 1978.

	<i>Samples</i>	<i>No. of</i>
Soils	...	406
Water	...	109
Fertilizers	...	28
Tea leaves	...	385
Feeds and raw materials for the the manufacture of feeds	...	153
Local maize	...	227
Feedlot effluent	...	85
Molasses	...	11
Urea/molasses	...	30
Poultry litter	...	8
Bagasse	...	6
Silage scum	...	4
Grass species	...	80
Sugar beets	...	3
Acacia	...	14
Sugarcane tops and stalks	...	96
Miscellaneous	...	63

XI. Animal Production Division

HEAD OF DIVISION: B. HULMAN, DIVISIONAL SCIENTIFIC OFFICER
(ANIMAL HUSBANDRY)

11.1 The main task of the Animal Production Division was to undertake livestock nutritional research with special reference to the use of sugarcane and its by-products and poultry litter in the nutrition of ruminants. In this respect Dr. T. R. Preston continued to be the consultant to the Division which was also involved in devising new farm buildings suited for the various classes of stock. The Division was also responsible to give advice on proper livestock husbandry practices to the Livestock Breeding Stations Division. Scientific Officers Mr. Ma Poon, Mr. Boodoo and Mr. Gaya were responsible to advise Curepipe Livestock Breeding Station, Richelieu Livestock Breeding Station and Palmar Livestock Breeding Station respectively on husbandry practices. The Divisional Scientific Officer continued to be responsible for formulating rations at the Livestock Feed Factory.

11.2 Mr. L. K. Ma Poon was acting as Divisional Scientific Officer until the return of Mr. B. Hulman from England on 25th January. Mr. Hulman came back after completing his M. Phil at the University of Reading. Mr. Hulman was acting as Divisional Scientific Officer up till 31st March when he was appointed following the retirement of Mr. J. A. C. Delaitre.

Mr. Ma Poon went on a study tour to Mexico, Santo Domingo and neighbouring countries from 21st April to 29th May. He attended the Second International Conference on the Use of Sugar Cane and its by-products in Animal Production held in Mexico from 25th to 27th April. A paper based on the work of Mr. Hulman was presented at the Conference.

Under the British Technical Assistance Mr. Gaya left for the University of Reading during the first week of September to follow a course leading to M.Sc. in Animal Production.

11.3 The Division participated in the industrial exhibition, Maurindex held in March at Coromandel to celebrate the 10th anniversary of independent Mauritius. Two livestock research papers were prepared for the occasion.

11.4 One wing each of the milk/beef feedlot at Richelieu and Palmar was ready, complete with milk parlour for machine milking and milk room. Machine milking of cows started in March at Richelieu and in August at Palmar. The cows took to machine milking without much difficulty and milk production returned to normal within a week.

As soon as the cows calve they are transferred to the milk/beef feedlot where they are machine milked once daily and the calves are reared by restricted suckling. The calves are allowed to suckle twice daily for the first month and thereafter once till weaning. The cows are given chipped whole sugarcane, molasses/urea and cow feed concentrate, whilst the calves are given molasses/urea, chipped whole cane and calf feed concentrate from about the age of one month. So far the cows have produced on an average 8 to 9 litres of milk daily including the 2 litres drunk by the calf. Calves have grown at the rate of 0.425 kg per day. Since the cows have not yet completed one lactation their lactation average is not yet available.

Progenies of Friesian heifers which were inseminated with Sahiwal, Creole or Simmental semen are under close observation at Richelieu. The male crossbreds have been put on performance test while the female will be evaluated for their milk production later on.

11.5 A ruminant research laboratory is expected to be operational next year at Richelieu Livestock Breeding Station. Equipment for the laboratory donated by the UNDP, started coming in during the year. The gas liquid chromatograph is already in operation and Professor Leng helped to set it during his visit in March.

11.6 *Research work*

DIVISIONAL SCIENTIFIC OFFICER : B. HULMAN

11.6.1 *Use of acacia (Leucaena leucocephala) forage in sugarcane based diets*

A randomised block design with 3 replicates was used to compare 3 dietary treatments involving different levels of fresh acacia (1, 2 or 3% of liveweight) which were supplements to a basal diet of **ad libitum** chopped

whole sugarcane containing urea at 3% of the cane dry matter. 9 individually-fed Simmental X Friesian bulls of about 70 kg were randomly allocated to the treatments. The experiment which was conducted at Richelieu Livestock Breeding Station lasted for 98 days.

Results

There was no significant difference in liveweight gains (Table 11.1) between the treatments. Although the results suggested a linear response of liveweight gains to increasing levels of acacia, the correlation coefficient of 0.5 was too low to establish a correlation between levels of acacia and liveweight gains. Acacia did not depress intake of dry matter. The gains were too low compared to 0.8 kg/day obtained with a diet of molasses/urea and acacia. Probably there is a problem with the roughage characteristic of sugarcane. This aspect is being investigated further.

TABLE 11.1

GROWTH RATES AND INTAKES OF BULLS RECEIVING
DIFFERENT LEVELS OF ACACIA

			Leave of acacia of (% body Weight)			S.E. of difference
			1	2	3	
No. of animals	...	...	3	3	3	
Average initial wt. (kg)	...	...	74.3	68.0	66.3	
Average final wt. (kg)	...	...	80.7	78.3	85.7	
Average daily gain (kg)	...	...	0.098	0.105	0.198	±0.052
Dry matter intake (kg):						
Total/day	...	...	1.74	1.92	2.08	
per 100 kg liveweight	...	...	2.3	2.6	2.7	
Dry matter intake from acacia (kg)	...	...	0.22	0.41	0.64	
Feed conversion Dry matter/kg gain	...	...	17.8	18.3	10.5	

11.7 Scientific Officer: A. A. BOODOO

11.7.1 Use of cattle effluent for production of biogas: effect of different retention times

Production of biogas, a source of energy on the farm, from the effluent of cattle fed on sugarcane and its by-products was investigated at Richelieu Livestock Breeding Station. Two 44-gallon polythene-lined drums were used as digestors and gas was collected by displacement of water.

An earlier investigation showed that with a 10 day retention time the production of biogas was 53 litres per day which is equivalent to 87 litres per kg total effluent dry matter. In this investigation retention times of 20 and 40 days were investigated in 2 replicates each.

Results

Digested effluent was richer in nitrogen content (Table 11.2) but there was a decrease in the content of both dry matter and organic matter.

As the retention time increased the daily gas production decreased (Table 11.3) showing that gas production is a function of dry matter content of the fresh effluent.

TABLE 11.2

COMPOSITION OF UNDIGESTED AND DIGESTED SLURRY (% DRY MATTER)

		<i>Undigested effluent (28 sample)</i>	<i>Digested effluent (28 samples)</i>
Dry matter	...	4.0 ± 0.36	1.93 ± 0.19
Organic matter	...	84.2 ± 0.67	77.9 ± 0.90
Nitrogen	...	1.7 ± 0.14	2.0 ± 0.15

TABLE 11.3

DAILY PRODUCTION OF BIOGAS AT DIFFERENT RETENTION TIMES

		<i>Retention times (days)</i>		
		<i>10</i>	<i>20</i>	<i>40</i>
Mean volume of gas produced (litres at 20°C)	...	53.2 ± 3.9	51.4 ± 2.8	47.6 ± 16.9
Volume of biogas per kg effluent dry matter (litres at 20°C)	...	87	142	248
Volume of biogas per kg effluent organic matter (litres at 20°C)	...	106	174	293

An attempt was made to increase the dry matter content of the fresh effluent to about 10% by addition of bagasse before it was added to the digester. This proved unsuccessful as a crust would form at the surface of the effluent inside the digester within 36 hours. The pressure of the biogas would burst the crust and effluent would spill all over, thus blocking the valves. However, effluent of higher dry matter content can be used if a built-in stirrer can be incorporated into the digester.

11.7.2 *Effect of an anti-protozoal agent on performance of growing calves fed a molasses-based diet*

It is believed that protozoa, which exist in large numbers in the rumen, are detrimental to growth and when they were eliminated by the use of an antiprotozoal agent (Terric GN 9) it resulted in a 43% increase in growth rate in growing cattle. It is thought that if commercial means of eliminating the protozoa from cattle in Mauritius were found it would have an important economic effect in that it would decrease the cost of meat production.

Four groups of 12-14 animal weighing about 100 kg were randomly allocated to one of 4 dietary treatments which consisted of molasses containing 2.5% urea *ad libitum*, 4 kg chopped whole sugarcane, 150 g fish meal per day and either no addition of terric or 1, 2 or 3 g of terric per kg of molasses. The trial which was conducted at the Richelieu Livestock Breeding Station lasted 70 days. However, at the end of 46 days the terric dose was doubled.

Results

Liveweight gains over a 70 day period (Table 11.4) were significantly ($P < 0.03$) higher for the group receiving 1 g terric/kg molasses (244 g/day) than for the control (122 g/day) or those given higher levels of terric (115 and 177 g/day for the 2 and 3 g terric/kg molasses respectively). Numbers of protozoa in the rumen (Table 11.5) increased over the experimental period on the control treatment but decreased for the terric treatments. The differences were significant ($P < 0.02$) for the samples after 71 days on trial (8.1, 6.4, and 4.8×10^{-4} /ml of rumen fluid for the control and increasing levels of terric respectively).

TABLE 11.4

MEAN VALUES FOR LIVELWEIGHT GAIN AND FEED INTAKE OF GROUPS OF CALVES GIVEN AD LIBITUM MOLASSES CONTAINING 0, 1, 2 OR 3GM OF TERRIC GN 9/KG MOLASSES, RESTRICTED FORAGE AND PROTEIN SUPPLEMENT

		Levels of Terric g/kg molasses				SE of X	Probability of F. test
		0	1	2	3		
No. of calves	...	13	12	14	13	—	—
Initial weight (kg)	...	87	95	99	91	—	—
Final weight (kg)	...	96	116	104	105	—	—
Daily weight gain (kg)							
0—72 days	...	0.122	0.244	0.115	0.177 ± 0.034		0.03
16—72 days ₁	...	0.078	0.290	0.126	0.198 ± 0.037		0.002
Feed intakes, kg/day							
Molasses/urea	...	2.4	3.1	2.4	2.6	—	—
Chopped sugarcane	...	4.0	4.0	4.0	4.0	—	—
Fish meal	...	0.15	0.15	0.15	0.15	—	—
Minerals	...	0.05	0.05	0.05	0.05	—	—
Total dry matter	...	2.98	3.44	2.95	3.09	—	—
Consumption index ₂	...	3.26	3.26	2.90	3.15	—	—
Feed conversion ₃	...	24.4	14.1	29.1	17.5	—	—

1 After period of adaptation

2 Intake of dry matter/100 kg liveweight

3 Intake of dry matter/kg gain in liveweight

TABLE 11.5

PROTOZOAL NUMBERS IN RUMEN FLUID OF CALVES GIVEN A MOLASSES BASED DIET AND 0, 1, 2 OR 3G TERRIC GN 9/KG MOLASSES

Days from experiment	begining of	Levels of terric g/kg molasses				SE of X	Probability of F test
		0	1	2	3		
		10 ⁻⁴ X /ml					
16		4.6	8.1	5.6	9.2	1.9	0.38
51		5.8	5.4	5.9	6.9	0.85	0.55
71		8.1	6.4	6.0	4.8	0.85	0.02

The results cannot be interpreted in a completely conclusive manner owing to the fact that there was no replication of treatment groups. Further trials are planned to examine the effects of terric administration.

11.7.3 Use of poultry litter in fattening diets based on molasses and bagasse

Poultry litter is a source of non-protein nitrogen and its effect on growing animals was investigated by including it into a feed which contained 20% raw bagasse, 35% molasses, 35% poultry litter, 4% groundnut cake, 4% fish meal and 2% minerals and vitamins. The mixture was given to a group of 10 growing Friesian cross bulls weighing about 128 kg at the Richelieu Livestock Breeding Station.

Results

At the end of 56 days the consumption of the mixture increased from 7 to 9.8 kg/head/day. During the same period the animal grew at an average of 0.650 kg/day. There has been no digestive troubles and the animals have been doing very well.

The poultry litter mixture contains on an average 76.3% dry matter (DM), 16.2% crude protein, 16.7% crude fibre, 0.6% other extract and 18.8% ash on DM basis. The trial is still under way and investigations will now be focused on the effect of varying the amounts of poultry litter in relation to the other ingredients.

11.7.4 Observations with lactating cows and their calves under feedlot conditions

A group of 9 lactating cows (8 Friesians and 1 Creole, of which 2 Friesians were in their 2nd lactation and the rest in their first) weighing about 376 kg and their calves were under close observation in one pen in the milch feedlot at the Richelieu Livestock Breeding Station from mid-October 1978.

The objective was to find out their performances in relation to their intakes. Daily intakes of feeds of both the calves and the cows were recorded together with the milk yield of the cows and the periodic weights of the calves.

The cows were given chopped whole sugarcane *ad libitum*, molasses containing 5% urea *ad libitum*, cow feed concentrate at the rate of 4 kg/head/day for the first 117 days and then 2 kg thereafter and minerals and water. The calves were allowed to suckle their dams twice daily, morning and afternoon. The cows were machine-milked once daily at 07.00 hr and the calves were allowed to suckle 30 mins later for 30 mins. In the afternoon the calves were allowed to suckle at 15.30 hr for 30 mins. An estimate of milk consumed by the calves was done by weighing them before and after suckling. The calves were allowed to suckle twice daily from birth to about a month old and later once only in the morning. At about a month old the calves were given chopped whole sugarcane, molasses/urea and a calf feed concentrate.

Results

Based on 65 days of observation it was found that the cows consumed on an average 25 kg of chopped whole sugarcane, 8.0 kg of molasses and 4 kg of cow feed concentrate per head per day. The average milk yield of the cows was 8.7 kg/head/day for the first 38 days when the calves were suckling twice daily (2.5 kg taken by the calf) and 7.3 kg afterwards when the calves were suckling once daily (1.1 kg taken by the calf). During the same time the consumption of chopped whole cane by the calves increased from 1 to 2.9 kg/head/day while their molasses/urea consumption increased from 0.128 to 0.948 kg/head/day. The calves grew at the rate of 0.425 kg/day.

Considering the nutritive values of the feeds (Table 11.6.) it is found that the cows were consuming about 17.6 kg of DM and 2.24 kg crude protein per head/day. With a digestibility co-efficient of 0.7 for the feeds the amount of digestible crude protein consumed would be about 1.57 kg. A cow of about 375 kg liveweight would be capable of producing theoretically more than double the amount of milk with the same consumption. Investigations as to why this was so is going on.

TABLE 11.6

NUTRITIVE VALUES OF DIFFERENT FEED INGREDIENTS

			DM %	Crude Protein % DM
Whole sugarcane	...	...	32.7	3.17
Molasses	...	...	78.0	5.06
Cow feed concentrate	...	...	86.0	18.8

Note: Urea contains 46% nitrogen

11.8 *Scientific Officer:* H. GAYA

11.8.1 *Effect of by-pass protein (fish meal) level on performance of cattle on a molasses/urea and restricted forage feeding system*

Five dietary treatments, which were levels of fish meal supplementation (0, 150, 300, 450 or 600 g/head/day) to a basal diet of sugar cane tops (3% of the body weight, fresh basis) and *ad libitum* molasses containing 2.5% urea, were compared in a completely randomised block design with 2 replicates. Groups of five Creole X Friesian heifers weighting about 137 kg were randomly allocated to the treatments. The trial which was conducted at the Palmar Livestock Breeding Station lasted for 157 days.

Results

Daily liveweight gains increased with increasing levels of fish meal (Figure 11.1) showing that 450 g of fish meal supplementation was probably optimal.

There was a significant ($P < 0.001$) difference between the treatments (Table 11.7) showing that fish meal supplementation increased liveweight gains. There was, however, no significant response to fish meal at levels higher than 450 g/day. At this level the feed conversion efficiency was also optimal.

Fig. 11.1

MEAN REGRESSED WEIGHT GAINS OF HEIFERS RECEIVING DIFFERENT LEVELS OF FISH MEAL TO A BASAL DIET OF MOLASSES/UREA AND FORAGE.



TABLE 11.7

MEAN VALUES FOR LIVEWEIGHT GAINS, FEED INTAKE AND FEED
CONVERSION OF HEIFERS FED DIFFERENT LEVELS OF FISH MEAL

		Level of fish meal g/day					S.E. of difference
		0	150	350	450	600	
No. of animals	...	10	10	10	10	10	—
Initial weight (kg)	...	139	138	125	133	136	—
Final weight (kg)	...	175	207	210	215	224	—
Regressed daily wt. grain kg		0.208	0.396	0.444	0.500	0.514	± 0.022***
Feed intake kg/day							
Molasses/urea	...	4.66	5.39	5.26	5.31	5.44	—
Sugarcane tops	...	4.49	4.89	4.87	4.97	5.27	—
Fish meal	...	0	0.15	0.30	0.449	0.593	—
Total DM intake	...	5.29	6.16	6.19	6.40	6.73	—
Intake of DM/100 kg live- weight	...	3.38	3.57	3.57	3.68	3.73	—
Molasses intake % of diet							
DM	...	74	73.5	71.5	69.9	68	—
Feed conversion DM/kg gain		25.5	15.6	13.9	12.8	13.1	—

The experiment was taken over and completed by Mr. M. R. Naseeven after the departure of Mr. Gaya for the University of Reading in September.

11.9 Scientific Officer: L. K. MA POON

11.9.1 Effect of different combinations of molasses/urea and sugarcane on animal performance

Two urea levels in molasses (5% and 10%) were compared in 2 replicates using 4 groups of 8 heifers weighing approximately 160 kg. The animals were also given chopped whole sugarcane *ad libitum*.

Results

Since the trial is due to be completed by March 1979 the results (Table 11.8) show animal performance for 34 days. There was an indication that the intake of cane increased with increase in urea level in the molasses.

Animal performance tended to be better when the concentration of urea in molasses was 5% rather than 10% (Table 11.8).

TABLE 11.8

MEAN VALUES FOR FEED INTAKE AND GROWTH OF HEIFERS RECEIVING
DIFFERENT LEVELS OF UREA IN MOLASSES

		Levels of urea in molasses%	
		5	10
No. of animals	...	16	16
Average initial weight (kg)	...	157.0	159.0
Average weight as at 22.12.78	...	172.9	169.3
Average daily gain (kg)	...	0.470	0.300
Intake of cane (kg)/day	...	10.2	10.8
Intake of molasses/urea (kg/day)		3.1	2.2

11.9.2 Performance testing of bulls

During the year 42 bulls of various breeds were put on test. So far 3 Creole bulls (Table 11.9) have been retained for breeding purposes. The first two bulls (715,718) gained an average of 1 kg/day the lower limit set for Creole bulls as far as growth potential is concerned. However, bull 720 is not much inferior with a gain of 0.958 kg/day.

TABLE 11.9

PERFORMANCE OF CREOLE BULLS

Tag No.	Date of birth	Dam	Sire	Av. lactation of Dam (kg)	Av. daily gain of bulls (gm) ('286 days)	Wt./Age (kg/ days)	Rank
715/2213	27.4.76	Josee 3/1/1/1	Sybille	2351	1063	0.7246	1
718/2239	6.8.76	Georgette 2/1/1	Mylord	2237	1000	0.7390	2
720/2203	2.4.76	Henriette 3/2/1	Sybille	2026	958	0.6017	

As at 31.12.78, 21 bulls were still under test — 7 have been on test since 27.9.78 and 14 joined on 15.12.78. The performances of 7 of the bulls (Table 11.10) show so far that they are quite promising after having been on test for 93 days.

TABLE 11.10

LIVEWEIGHT GAINS OF BULLS ON PERFORMANCE TEST

Tag No.		Breed	Age (Days)	Days on test	Average Daily Gain/kg.	Wt. (kg)/ Age (days)
Br 257	...	C	401	93	1.23	0.571
Br 3	...	C	349	93	1.01	0.602
Br 5	...	CF	343	93	0.89	0.449
Br 7	...	CF	338	93	0.88	0.565
Br 9	...	CF	324	93	1.18	0.645
Br 15	...	CF	298	93	1.06	0.708
Br 23	...	C	280	93	0.28	0.600

Since individual feeding facilities were not available data on feed intake and feed conversion could not be calculated.

1 1.9.3 The apparent in-vivo dry matter digestibility determinations by the dacron bag technique

The aims of the present studies were :

1. To determine and compare the dry matter disappearance of various feeds.
2. To determine the effect of protein protection on the rate of dry matter disappearance of various feeds.

Four young individually tied bulls of 90 — 100 kg liveweight and fitted with rumen canula (Hackar's method) were used. Two of the bulls were fed *ad lib.* chipped whole sugar cane containing urea at the rate of 3% cane DM and acacia at 2% of liveweight. The other 2 received molasses containing 5% urea *ad lib.* and acacia at 2% of liveweight.

Dacron bags, obtained from Dr. D. de B. Hovell were made from parachute material. In each bag 5 g DM of the substrate for digestibility determination were put. DM digestibilities of chopped dry old sugarcane leaves and chipped fresh mature leaves were compared. In another trial chipped cane pith was compared with chipped cane rind. The effect of drying temperature (60° C or 100° C) on the dry matter disappearance of acacia was also investigated.

Results

Chipped old dry cane leaves appeared to be more digestible than chipped mature cane leaves and it seemed that most digestible material disappeared within the first 6 hours (Table 11.11). Most of the cane pith and rind was rendered digestible within 24 hours (Table 11.11) with the pith being more digestible than the rind.

TABLE 11.11

DRY MATTER DISAPPEARANCE OF VARIOUS MATERIALS IN THE RUMEN OF CATTLE

Incubation Time (hr)	% DM disappearance			
	Fresh and mature cane leaves	Old and dry cane leaves	cane rind	cane pith
3	17.5	19.4	.	
6	17.1	20.4	13.3	23.3
12	21.4	26.8	16.6	26.3
24			15.3	28.3
48			21.3	31.9

Heating of acacia depressed dry matter digestibility (Table 11.12 and Figure 11.2). The rate of dry matter disappearance was lower in animal fed sugarcane than in those fed acacia.

TABLE 11.12

DRY MATTER DISAPPEARANCE OF ACACIA DRIED AT 60°C OR 100°C IN THE RUMEN OF CATTLE FED SUGARCANE OR MOLASSES

Incubation time (hr)	% Dry matter disappeared			
	Sugar cane		Molasses	
	60°c	100°c	60°c	100°c
6	37.6	33.4	43.0	38.0
12	40.8	35.6	63.2	55.0
24	50.0	45.8	68.0	67.6
48	68.1	64.6	70.2	69.4

Fig. 11.2

EFFECT OF DRYING ACACIA AT 60°C OR 100°C ON DRY MATTER
DISAPPEARANCE IN CATTLE FED MOLASSES OR SUGAR CANE



11.10 At the Palmar Livestock Breeding Station regular performance testing of goats was carried out for selection purposes. Male and female goats were selected for replacement stock on the station and for distribution to breeders through the Extension Services.

A breeding programme for the Wessex Saddleback pigs received from Seychelles was established. Breeding pigs were selected as replacement stock on the station.

A selection of Zebu bulls was made for distribution to people who would use these animals for draft purposes. The animals were castrated before distribution.

Culling of unproductive and unfit animals was done regularly in order to maintain good productivity.

11.11 The Animal Production Division had the pleasure to welcome the following visitors during the year:—

- 14. 5.78 Mr. Kassim Makama Miwi, Head of Animal Production Division of Zanzibar
- 18. 8.78 Messrs George Magombe, Madalali and Samizi of FAO Council Mission
- 23. 8.78 Dr. D. Muller from Singapore
- 25. 8.78 Dr. D. L. A. Shepherd, Lecturer at the University of Reading
- 2. 9.78 Messrs Seydi and Ibrahim of OCAM
- 11. 9.78 Mr. A. Tacconis, Expert of Centre for Industrial Development, Brussels
- 26.10.78 Members of Mauritius Meat Producers Association
- 7.11.78 Mr. J. C. Gilibert, Chamber of Agriculture, Reunion.

XII. Division of Veterinary Services

HEAD OF DIVISION: DR. M. F. MOSAHEB, PRINCIPAL VETERINARY OFFICER

12.1 During the year under review the Division of Veterinary Services continued to provide Artificial Insemination and Veterinary Aid services to the cowkeepers. Apart from the above mentioned services the Division was also responsible for the following activities: Health of animals on Government Stations, Prison Farms and in the field, the running of the Animal Health Laboratory, carrying out Tuberculin test and disease surveys on herd cattle at Government Stations, Sugar Estates and in the field; issuing import permits, Veterinary Certificates of health for export of live animals, carrying out meat inspection at various Cold Storages for all imported meat and meat products and enforcing the Animal Disease Ordinance through quarantining of both large and small animals.

12.2 *Artificial Insemination Services*

Semen from Friesian and Creole bulls was regularly collected at the Artificial Insemination Centre and was used in the liquid state to inseminate cattle. In line with the Ministry's breeding policy, Friesian semen was used to inseminate cows in Moka and Upper Plaines Wilhems areas whereas cows in the rest of the island were inseminated with Creole semen. During the year a total of 10,277 inseminations were carried out. The average conception rate was 60%.

12.3 *Animal Health*

Apart from two cases of Babesiosis diagnosed at Le Morne Estate, a case of anaplasmosis at Belle Isle Estate and a case of Leptospirosis at Terracine Estate no other diseases were recorded during the year.

12.4 *Brucellosis*

The survey at Government Stations, Sugar Estates and in the field was continued but no reactors were recorded.

12.5 Bovine Infectious Kerato conjunctivitis (Pink Eye) is under control at Palmar and Richelieu Livestock Breeding Stations although it tends to increase during the summer months when the fly population is on the increase—Regular spraying and fogging are being carried out at both stations.

12.6 *Dermatophilosis*

A few cases of dermatophilosis were reported from Belle Isle Estate and from the field. Affected animals were successfully treated.

12.7 *Veterinary Aid*

In addition to cases attended on Government Stations and Prison Farms, 4,998 cases requiring veterinary aids were attended in the field. This included 30 cases of enucleation of ovarian cysts, 621 cases of calcium and Phosphorous deficiencies, 481 cases of udder troubles, 545 of calving troubles, 976 cases of digestive disorders and 2,345 miscellaneous cases like abscesses, injuries, etc.

12.8 *Cage Birds*

The cage birds kept at both the aviaries at Cascavelle and Rivière Noire continued to benefit from the services of veterinary officers.

12.9 *Legislation on Animal Diseases*

Legislation empowering veterinary officers to test individual cows in the field for Tuberculosis and Brucellosis was passed. Both tests were started in late 78. 200 cows were tested but none of them reacted to either Brucellosis or Tuberculosis.

12.10 *Animal Health Laboratory*

The Animal Health Laboratory was concerned with (a) General diagnostic work; (b) vaccine production; (c) sterilisation of livestock products and preparation of some medicinal solutions.

12.11 *General Diagnosis*

A total of 2,875 specimens were submitted to the laboratory for pathological, bacteriological, parasitological, Biochemical and haematological examinations. These included live animals, animal carcasses, blood, milk, swabs, stool samples and skin scrapings and were submitted by Government Stations, private owners and Police Authorities.

12.12 *Vaccine Production*

The following poultry vaccines were produced—

<i>Type of Vaccine</i>		<i>No. of doses produced</i>	<i>No. of doses sold</i>
Fowl Pox	...	346,400	164,050
Newcastle Disease La Sota	...	193,000	80,185
Newcastle Disease Hitchner B	...	517,500	217,885

The poultry vaccinators of the Animal Health Laboratory carried out vaccinations for backyard poultry keepers and gave them basic advice on poultry management.

12.13 As in the previous year, the laboratory staff collected 24 warts from the field and prepared antogenous vaccines which were later inoculated into the affected animals with very good results.

12.14 *Sterilisation of Livestock Products*

343 specimens including raw hides articles, stuffed animals and animal skins were submitted to the laboratory where they were sterilised prior to release to various importers.

12.15 *Preparation of Medicinal Solutions*

Needy cowkeepers continued to benefit free of charge medicinal solution like calcium borogluconate and potassium iodide solution prepared in the Laboratory.

12.16 *Enforcement of Animal Disease Ordinance*

To prevent the introduction of exotic diseases and at the same time to maintain the low incidence of animal diseases in the country, the provisions of the Animal Disease Ordinance were rigidly applied to all imports of animals and animal products. The quarantine kennels, the catteries, both at Reduit and the M.S.P.C.A. Rose Hill, the poultry quarantine unit at Reduit, the quarantine station at Roche Bois and the various authorised quarantine on Sugar Estates and Poultry Farms were maintained.

12.17 *Importation of Live Animals*

49 ships and 28 aircraft bringing live animals were cleared by the Veterinary Officers and all the animals including cage birds and pets were quarantined at the various stations. The imports have been as follows:

<i>Country of origin</i>	<i>Bullocks</i>	<i>Sheep</i>	<i>Goats</i>	<i>Pigs</i>
Australia ...	3,843	1,971		
South Africa ...	386			
Rodrigues ...	159		7,011	2,712

In addition to the above 17 dogs, 2 cats, 12 cage birds, 29 horses and 55,067 day-old chicks were received from various countries.

12.18 *Livestock Products*

During the year 2,404 import and 765 landing permits were issued. All frozen meat and meat products landed were subjected to veterinary inspection at various cold storages prior to release of sale. The list of imports has been as follows:

<i>Products</i>	<i>Quantity Kgs</i>
Frozen beef and beef products ...	5,095,188
Frozen mutton, offals and preparations ...	2,129,367
Frozen goat meat and offals ...	193,569
Frozen pork and pork products ...	295,503
Frozen poultry (Turkeys and ducks) ...	135,517
Livestock feeds (poultry, pig, dog, rabbit, pheasant, horse and ducks) ...	6,858,605

12.19 *Slaughter Data*

During the year 1,131 calves, 399 cows and 1,491 bulls of the milch breed were slaughtered, producing 320,874 kgs of beef. In addition, 1,119 herd cattle and 37 bullocks imported from Rodrigues were slaughtered yielding 142,687 kgs of beef. Further 3,566 bullocks from Australia and 39 from New Zealand were slaughtered and produced 708,867 kgs of beef.

12.20 Likewise, 20,851 kgs of mutton was produced in Mauritius and from 706 imported sheep, 16,546 kgs of meat was produced. In respect of imported and local goat, from a total of 18,458 head slaughtered, 112,884 kgs of goat meat was obtained, 8,825 pigs, including those imported from Rodrigues, were slaughtered yielding 526,537 kgs of pork.

12.21 The slaughter house returns revealed the following average weight of imported and local cattle slaughtered during the year.

	<i>Kgs</i>
Local herd cattle ...	122
Local milch cow ...	128
Local bulls of milch breed ...	104
Calves of local milch breed ...	101
Rodrigues cattle ...	147
Australian cattle ...	197
New Zealand cattle ...	108

12.22 From the meat inspection returns, 3 partial seizures on account of bovine tuberculosis were reported from different slaughter houses giving .07% of tuberculosis cases. This percentage is derived from a total of 4,140 milch animals and herd cattle slaughtered during the year.

12.23 In addition to the above 11 cases of alleged illegal slaughter, 27 cases of alleged cruelty to animals and 6 cases of animals involved in accidents were examined and reports sent to the Police Department.

12.24 *Advisory Services and Lectures*

Large and small livestock breeders continued to benefit from advice on management and health provided by the Veterinary Officers. The Veterinary Officers also lectured to students of the School of Agriculture and School of Industrial Technology of the University of Mauritius.

12.25 *Staff Movement*

Veterinary Officer Beeharry returned from Kansas State University after successfully completing his M.Sc. in Infectious Diseases. Technical Officer M. Rengasamy returned from Nottingham, U.K. after obtaining a degree in B.Sc. in Agricultural Science. Senior Technical Officer N. Govendasamy returned from Louisiana after obtaining a B.Sc degree in Plant and Animal Protection.

12.26 *Retirement*

Senior Technical Officer C. Adelson, Senior Technical Assistant N. Anthoo, Senior Laboratory Attendant Naidoo and Stockman Bissessur retired from the Service. Technical Officer Hee Song resigned from the Service.

12.27 *New Appointment*

F. Beejadhur and R. Uppiah joined the Division as Agricultural Assistant and Senior Laboratory Attendant respectively.

12.28 *Revenue*

	Rs
Veterinary fees ...	24,430.84
Sale of Vaccines ...	30,656.77
Quarantine fees ...	33,279.24
Adv. a/c: Dogs ...	8,234.76
Sale of Milk ...	NIL
Import Permits fees ...	2,848.00
Miscellaneous ...	2,310.35*
Lease of Cows ...	100.00
Sale of Drugs ...	7,677.62

*Sterilisation, Post Mortem fees, Blood analysis, rent.

XIII. Dairy Chemistry Division

OFFICER-IN-CHARGE: J. NG MAN SUN — SCIENTIFIC OFFICER

13.1 At the beginning of 1978, the Dairy Chemistry Division extended its premises into the ground floor of the newly-completed pesticide laboratory two-storey building. The staff have now more moving and working space, but it will take some time before all the necessary equipments are obtained.

13.2 During the year 1978, the Division completed its survey of the quality of milk from the creole cows of small cowkeepers. Although pasteurisation of milk from Curepipe Livestock Breeding Station was discontinued, the Division kept on monitoring samples of raw milk from there, as well as those from Richelieu and Palmar Livestock Breeding Stations. The Division also undertook the analysis of pasteurised and sterilised milks and locally made dairy products such as yoghurt, ice-cream, cheese, ghee, etc. in order to assess their chemical, bacteriological and keeping qualities and advise, where necessary, on ways of improving those qualities. The manufacture of soft cheese was also started on an experimental basis under the guidance of an FAO Technical Dairy Officer, whose services were temporarily available to the Ministry.

13.3 *Survey of the quality of milk from creole cows of small Cowkeepers*

(Scientific Officer J. Ng Man Sun and five Technical Officers)

13.3.1 The whole staff was in one way or another involved in the survey: for collecting and analysing the samples and processing the data.

13.3.2 Table 13.1 shows the monthly averages for the year and figs. 13.1 and 13.2 show the frequency distributions of fat and protein.

13.3.3 The results obtained throughout the survey show that the milk varies fairly widely in composition. Although the average fat content lies around 3.6%, which is a reasonable value, there are still about 25% of the samples which have less than 3% fat. The protein content and to a lesser extent the lactose content appear to be rather on the low side. The former has an average value of 2.94% and the latter an average value of 4.51%. This fact should account for the rather low percentage of solids-non-fat obtained. On the other hand, the calcium content is quite normal (at about 0.12% Ca).

FIG 13. 1

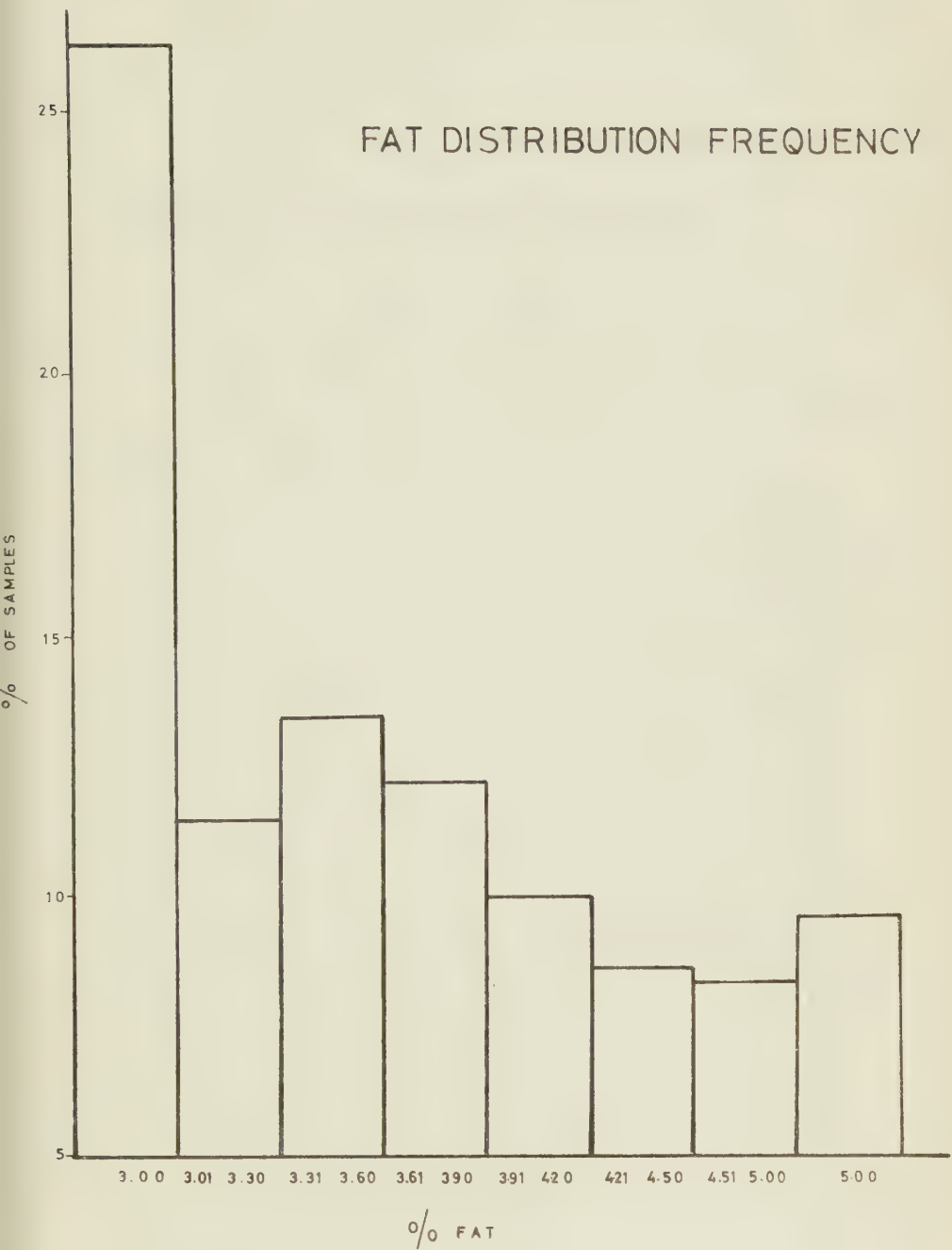


FIG 13. 2

PROTEIN DISTRIBUTION FREQUENCY

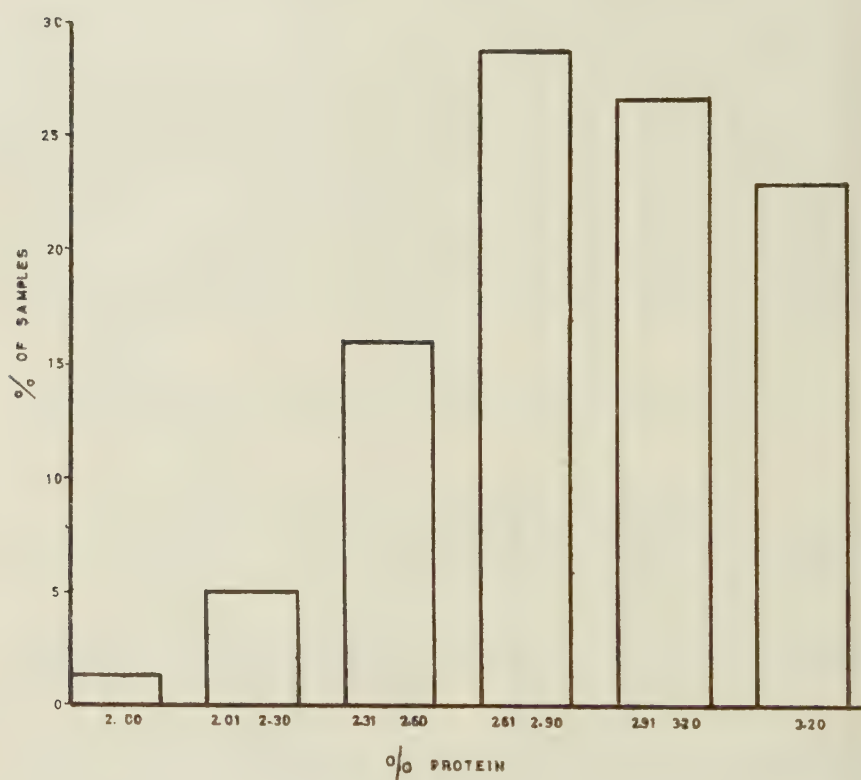


TABLE 13.1
RESULTS OF SURVEY OF MILK FROM SMALL COWKEEPERS

1978	No. of samples	Total Solids %	Solids-non-fat %	Fat %	Protein %	Density	T. Acidity*	Calcium %	Freezing Point °C	Coliform Organisms/ml	Total Bacteria per ml	pH	Lactose %	Whiteside Test—ve %	Whiteside Test+ve %
January	239	11.07	8.37	3.70	2.90	26	16	0.130	— 0.523	1040	139×10^3	—	4.20	—	—
February	302	12.19	8.50	3.69	3.01	26	16	0.120	— 0.550	2770	250×10^3	6.65	4.34	94.83	5.17
March	361	11.98	8.44	3.54	3.06	26	16	0.119	— 0.519	2510	281×10^3	6.57	4.79	97.30	2.70
April	334	11.84	8.21	3.63	2.97	26	15	0.123	— 0.517	1950	273×10^3	6.57	4.65	99.61	0.38
May	407	11.83	8.23	3.60	2.92	26	16	0.125	— 0.523	2580	248×10^3	6.60	4.58	99.02	0.98
June	388	12.13	8.46	3.67	2.87	26	15	0.127	— 0.524	2160	199×10^3	6.59	4.38	98.50	1.50
July	371	12.23	8.57	3.66	3.06	26	15	0.135	— 0.525	1850	199×10^3	6.58	4.64	99.03	0.97
August	394	12.10	8.67	3.43	2.83	26	15	0.125	— 0.521	1350	191×10^3	6.62	4.53	99.65	3.35
September	342	12.13	8.54	3.59	2.94	26	15	0.116	— 0.525	2170	200×10^3	6.61	4.56	97.96	2.04
October	336	11.81	8.26	3.55	2.96	25	15	0.117	— 0.517	1830	218×10^3	6.57	4.40	98.44	1.56
November	332	12.22	8.73	3.60	2.85	27	15	0.115	— 0.523	3650	435×10^3	6.56	4.55	92.53	7.47
December	292	12.24	8.76	3.71	2.86	27	16	0.114	— 0.522	2110	303×10^3	6.54	4.58	94.48	5.52

* Titratable Acidity expressed as decigrammes lactic acid per 1000 gm of milk.

13.4 Analysis of milk from the Livestock Breeding Stations

S. RAMESSUR, TECHNICAL OFFICER

13.4.1 Rising costs coupled with the rather low selling price of the pasteurised milk (Re 1.25 per kg) had made pasteurisation at Curepipe Livestock Breeding Station an unprofitable proposition. So it was discontinued at the beginning of the year, and all the milk is now despatched raw to the hospitals.

13.4.2 However, the dairy laboratory still collected, for analysis, samples of bulk milk daily from Curepipe Livestock Breeding Station, twice weekly from Richelieu Livestock Breeding Station and occasionally from Palmar Livestock Breeding Station.

13.4.3 The average results for the year for Curepipe and Richelieu Livestock Breeding Stations are shown below :

		<i>Curepipe LBS</i>	<i>Richelieu LBS</i>
Fat %	...	3.48	3.71
Protein %	...	2.98	3.35
Density (at 15°C)	...	1.028	1.027
Freezing Point	...	-0.540°C	-0.534°C
Coliform Org/ml	...	122 × 10	309 × 10
Total Bacteria/ml	...	95 × 10 ³	240 × 10 ³

13.4.4 The figures above reflect more or less the results of analysis obtained throughout the year. One striking feature about them is the fact that the protein content of the milk from Richelieu Livestock Breeding Station is invariably higher than that from Curepipe Livestock Breeding Station. Several factors may help to explain such a difference, namely differences in feed composition, average age of the animals, breed and degree of occurrence of mastitis. At Curepipe, the cows are mainly of the local creole breed with a few crossed with Friesian while at Richelieu they are mainly Friesian. Furthermore, the protein content of milk collected on survey from the creole cows of small cowkeepers is generally less than 3% (fig. 1), which is very close to the value obtained for Curepipe Livestock Breeding Station. Experiments are being conducted to determine the effect of the various factors on milk composition.

13.5 *Assessment of imported and locally made dairy products*

13.5.1 U.H.T. (Ultra high temperature) sterilised milk and pasteurised milk (Miss C. Jomadar, Technical Officer).

13.5.1.1 Most of the different brands of U.H.T. milk, imported mainly from South Africa and France have been analysed.

Typical results are shown below :

% Dry Matter	...	13.19
% Solids-non-fat	...	10.35
% Fat	...	3.15
% Protein	...	3.38
Titrateable Acidity	...	0.16 (% lactic acid)
Freezing Point	...	-0.538°C
Density (15°C)	...	1.028
Coliform Org/ml	...	Nil
Total Bacteria/ml	...	25×10^5
ph	...	6.56
% Lactose	...	4.15
% Ash	...	0.520 M. B. R Time :> 5 hours

They are all found to be of a fair standard, chemically and bacteriologically. The keeping quality also is very good, with a methylene blue reduction (M.B.R.) time greater than 5 hours.

13.5.1.2 Part of the milk produced at Richelieu Livestock Breeding Stations is sold to a private dairy, which retails it together with milk from other sources in plastic bags after pasteurisation. The Dairy Chemistry Division monitors regularly the pasteurised milk which is marketed. Generally, the pasteurisation is found to be adequately done, as indicated by the phosphatase test. Occasionally, there seems to be post-pasteurisation contamination, as shown by the presence of more than the permissible level of one coliform organism/millilitre of milk.

General characteristics of the pasteurised milk are shown below :

% Dry matter	...	12.80
% Solids-non-fat	...	9.64
% Fat	...	3.21
% Protein	...	3.36
Titrateable acidity (as % lactic acid)	...	0.17
Freezing Point	...	-0.538°C
Density (at 15°C)	...	1.028
Phosphatase test	...	-ve
Coliform org/ml	...	8×10^3
Total bacteria/ml	...	29×10^5
pH	...	6.56
% Lactose	...	4.54
% Ash	...	0.543

13.5.2 YOGHURT (MRS. M. MUDHOO, TECHNICAL OFFICER AND MR. P. RANGASAMY, TECHNICAL OFFICER)

Yoghurt is one type of fermented milk which seems to have been readily adopted by the population for its sale is widespread throughout the island. Assessment of three brands on the market has given the average results shown in Table 13.2.

It would be noted that :

- (i) as expected the dry matter content of the sugared and fruit-added yoghurts are higher than that for 'natural' yoghurt.
- (ii) they have all a low fat content of about 1% or less.
- (iii) they have a rather high acidity, probably due to a too long period of incubation.
- (iv) the number of coliform organism/ml is high.

13.5.3 ICE-CREAM, AND GHEE (P. PANDAY, TECHNICAL OFFICER)

13.5.3.1 Ice-cream is another milk product which is very popular and sold in large quantities. Besides being a very acceptable food, particularly to children, it is highly nutritious if correctly formulated. However, a strict quality control should be exercised by the manufacturer in order to see to it that no pathogenic organisms are present in the product. Pasteurisation of the mix is therefore essential. On a small scale heat treatment in vats can be carried out.

13.5.3.2 The table below gives the chemical and microbiological qualities of four different brands of ice-cream, which were analysed in the course of the year.

TABLE 13.2
Results of assessment of three brands of yoghurt marketed

	Natural			Sugared			With Fruits		
	A	B	C	A	B	C	A	B	C
Total Solids% (Dry matter)	12.3	11.6	16.2	20.6	18.0	17.7	21.14	23.0	16.5
Fat %	0.90	0.75	0.80	0.74	0.72	0.50	0.90	1.0	0.7
Protein %	4.0	3.48	3.57	4.59	4.02	3.12	4.26	4.06	3.17
Titratable Acidity (as % lactic acid)	1.61	1.22	1.12	1.35	1.15	0.96	1.36	1.38	1.16
pH	4.01	4.07	3.75	3.82	4.12	3.75	4.44	3.95	3.91
Coliform Org/ml	10×10^3	15×10^3	11×10^3	10×10^3	25×10^3	22×10^3	15×10^3	10×10^3	24×10^3
Total Bacteria/ml	40×10^5	195×10^5	76×10^5	14×10^5	76×10^5	37×10^5	11×10^5	20×10^5	40×10^5

Brand	1	2	3	4
Titratable acidity (as % latic acid) ...	0.14	0.18	0.16	0.19
% Total solids ...	32.25	31.0	33.0	34.5
% Fat ...	10.75	7.0	8.5	8.7
% Sucrose ...	9.0	11.5	11.5	9.3
% Overrun*	45.	46	80	93
Coliform Org/ml ...	4×10^3	35×10^8	30×10^3	10×10^3
Total bacteria/ml ...	1×10^6	1×10^6	1×10^6	1×10^6

*The % overrun is a measure of the amount of air whipped into the ice-cream during its manufacture and is expressed as :

$$\frac{\text{Weight of 1 litre of mix} - \text{Weight of 1 litre of ice-cream}}{\text{Weight of 1 litre of ice-cream}} \times 100$$

13.5.4 Ghee

13.5.4.1 Ghee is used by a large section of the population for cooking and baking purposes. Some of it is made locally but the major part is imported from Australia and New Zealand. Analysis of both the local and imported ghees have been carried out to determine their respective characteristics.

13.5.4.2 The following table shows typical results of analysis together with corresponding values for pure butter fat.

	Local ghee	Imported ghee	Pure butter fat
% Moisture ...	0.42	0.053	—
% free fatty acid (as oleic acid) ...	0.104	0.095	0.1
Reichert-Meissel (RM) Value	10.30	32	22-35
Polenske value ...	3.45	2.5	1.5-4.5
Saponification value ...	184	224	220.
Iodine value ...	69	35	32-50

13.5.4.3 It would be recalled that the iodine value, which measures the degree of unsaturation of the fat, is generally higher for vegetable fat than for butter fat. Furthermore, adulteration of butter fat by vegetable fat can drastically reduce its RM value, which is a measure of the amount of glycerides of short chain fatty acids such as butyric acid.

13.5.5 Fresh cottage cheese—(MRS. MUDHOO, TECHNICAL OFFICER)

13.5.5.1 There are two types of fresh cottage cheese on the market which are manufactured by a local dairy. One contains practically no fat and another with a fat content of about 7%. Analysis of those has given the following results :

	1st Type	2nd Type
% Fat ...	0.20	7.1
% Protein ...	4.50	10.1
% Dry matter ...	15.12	16.7
% Moisture ...	84.9	83.2
pH ...	4.4	4.7

13.5.5.2 Both types are very soft, owing to their fairly high moisture content. From information gathered, skimmed milk is being used for the first type and skimmed milk enriched with cream is used for the second type.

13.6 *Staff movement*

Mr. P. Mardamootoo, Scientific Officer, is still on study leave. Miss C. Jomadar joined the staff in January to give assistance at Technical Officer level and was later appointed Technical Officer (Scientific). She was transferred to the Agronomy Division at the end of October. Mr. P. Rangasamy returned from study leave and resumed duty in March. Mr. S. Ramessur attended an eight-week seminar in the Federal Republic of Germany in September on the subject of 'Intensification of Meat and Milk Production in Tropical Countries'.

XIV. Crop Experiment Stations Division

HEAD OF DIVISION — Y. E. DOOMUN — AGRICULTURAL SUPERINTENDENT

14.1.1 *Introduction*

The main activities of the Division were the production of vegetable seeds, the propagation of fruit trees and ornamentals and the provision of facilities to officers engaged in research work. The Division was also responsible for the maintenance of the Royal Botanic Gardens of Pamplemousses, Government House, Le Reduit, Government House, Port Louis, Head Quarters House, Vacoas, Quatre Bornes Demonstration Citrus Orchard and the Central Reservation of the Trunk Road. The stations also provided produce to Charitable institutions.

14.1.2 The mango orchards at Richelieu and Abercombie Nursery and litchi orchards at Richelieu, Barkly Experiment Station and Royal Botanic Gardens yielded good crops. The planting of new plant species at Royal Botanic Gardens continued under the advice and guidance of the Sub-Committee of the main Royal Botanic Gardens Advisory Committee.

14.1.3 The seed production programme was implemented. The amount of seeds produced was sufficient to plant 5600 acres of land compared to 2150 acres in 1974. The production of plants also increased considerably with a total of 72,416 units.

14.1.4 The present potting shed is being transferred to the fenced area of the nursery to make room for a new seed store with a central refrigeration plant.

14.1.5 New special laminated pouches were introduced by the end of last year. They are attractively designed and will help in the longer storage of seeds.

CUREPIPE EXPERIMENT STATION

SENIOR TECHNICAL OFFICER — D. GYA

14.2.1 *Location :*

Latitude 20° 19'54"

Longitude 57° 30'30"

Altitude 1830 ft.

14.2.2 *Climate*

Curepipe Experiment Station is situated in the super humid zone with an average annual rainfall varying between 3,048 mm and 4,064 mm. (i.e. 120 and 160 ins.). The number of wet days per annum always exceed 200.

14.2.3 *Weather Conditions*

The total rainfall recorded during the year was 2,930.5 mm. The highest rainfall was during the month of April 649.8 mm and the lowest was during the month of September 75.0 mm. The total number of days 255.

14.2.4 *Cropping Programme (Seed-Production)*

Fruits and seeds of the following were sent to Barkly Experiment Station:

Brède de chine Frisée, Beans variety Long Tom, Brède de chine variety Hamchoy, Margoze variety C.A.M., Cucumber white, Squash Golden Custard, Pumpkins, Calebasse Pipengaille, Chillies carri.

14.2.5 *Vegetables for sale*

(Planted for demonstration and preservation of planting Material).

Pineapple (1,397 units), Watercress (1,302 kgs), Margoze CAM (35.5 kgs), Peas local (16 kgs), Cucumber local (1,621 units), Cucumber green (16 units), Cowpeas (59.5 kgs), Chillies Dunputh (232 kgs), Kew choy (209 kgs), Arouille violette (978.5 kgs), Brède Songe (132.5 kgs), Maize cobs (788 units), Pumpkins (858.5 kgs), Banana green (594 units), Brède Martin (137.5 kgs), Chillies Carrie (4.5 kgs), Chillies cipaye (41.5 kgs), Chou drageons (381.5 kgs), Brin-gelle (2.5 kgs), Sweet potato local (4,627 kgs), Sweet potato S.M. (1,101.5 kgs), Coriander (25.5 kgs), Leeks (1,483 units), Arouille carri (154 kgs), Squash Golden Custard (246 units), Beans Long Tom green (154 kgs), Ducks 6 kgs), Geese (27.5 kgs), Calebasse (197.5 kgs), Shallots (14.5 kgs), Radish (312 units), Rave Blanche (1,143 units), Pipengaille (17.5 kgs), Mandarin (12.5 kgs), Tangelo (1 kg), Chou chou (289.5 kgs), Spinach (87.5 kgs), Cornflour (24.5 kgs), Arrowroot (3.5 kgs), Brède Hamchoy (119 kgs), Lettuce Mignonne (301 units), Beans Local Red, green (28 kgs), Beetroot (28 units), Onions (69 kgs), Cauliflower (595 units), cabbage local (922 units), Strawberry (2 kgs 690 gms), Potatoes (4,540.5 kgs), Garlic with green leaf (42 kgs), Duck eggs (102 units).

14.2.6 *Fodder*

Fodder is being supplied to La Brasserie Fodder Section.

14.2.7 *Sericulture*

The project started in March 1973 and is at present under the supervision of the Division of Entomology.

14.2.8 *Livestock*

1. Ducks Muscovite	...	88
2. Duck Pekinese	...	1
3. Geese	...	5

The sole Pea hen died on 10th December, 1978. Due to old age four ducks and seven geese were sold.

PLAISANCE EXPERIMENT STATION

SENIOR TECHNICAL OFFICER — D. GYA

14.3.1 *Location:*

Acreage	...	18.96 arpent
Soil type	...	Latosolic reddish prairie (L.R.P.)
Region	...	Humid
Altitude	...	50 ft above sea level

14.3.2 *Weather Conditions*

The weather was fair. Drought conditions prevailed during the months of September, October and December. April was the wettest month. The total rainfall recorded during the year was 1517.0 mm.

CROPPING PROGRAMME

14.3.3 *Plant Propagation*

Coconut orchards: Malayan Dwarf Yellow plants have started flowering.

Citrus orchard: Old trees have been removed with the exception of one plant of Juddoo Grape fruit. A new orchard will be created during this year.

Mangoes: Most of the plants in the new orchard have started bearing fruits. However, in the old orchard, flowering and fruiting was very limited.

14.3.4 *Seed Production*

The following crops were planted for seed production during the year. Mustard cabbage variety Hamchoy, Celery cabbage variety Distins, Peas variety local, Peas variety Chinese, Broad bean (Bokla), Sweet pepper variety Dunputh, Eggplant variety Farcie, Groundnuts (Local cabri).

14.3.5 *Disposal of Produce*

The sale of produce amounted to Rs 1,868,50 during period 3rd January to 30th June 1978. As from 1st July all produce harvested on the station was sent to Plaisance Demonstration Centre for sale. 31 coconuts shoots and 62 kg onion were sent to Reduit Experiment Station for sale. 75 kg onion and 7.5 kg. green peas were sent to Curepipe E.S. for sale.

14.3.6 The following were planted for sale and demonstration during the year:— Beans variety long Tom, Sweet potatoes SM varieties, Pomme d'amour, Calebasse Natal, Cucumber white, Coriander, Lettuce variety Mignonette, Onion variety local red from March setts, Mustard cabbage variety Frisee.

The following were sent to Plaisance Demonstration Centre for sale:— Mustard cabbage variety Frisee, Coriander, Beans variety long Toms Calebasse, Peas (green), Lettuce (Mignonette), Onion, Sweet potatoes, Breadfruit, Grapefruit, Pamplemousses, Coconut shoots, Bullock's heart, Bananas (green), Mangoes.

14.3.7 *Seed Production and Plant Propagation*

The programme was implemented and fruits and seeds of the following were sent to Barkly Experiment Station. Mustard cabbage variety Hamchoy (22kgs), Celery cabbage variety Distins (9kgs), Okra (lalo) variety Perkins Spineless (3565) units), Groundnuts variety local cabri (3672 kgs), Bokla (170kgs), Peas variety local (649kgs), Peas variety Chinese (84kgs), Sweet pepper Dunpuh (639 units), Eggplant variety Farcie (Harvest continues) (99 units), Coconuts variety Malayan dwarf green (3 units), coconuts variety Malayan dwarf red (54 units), coconuts variety Pemba (109 units), Custard apple (9 units), Bullock's heart (2 units and 200 seeds), Mangoes variety Baissac 470 units).

CENTRAL EXPERIMENT STATION

SENIOR TECHNICAL OFFICER — C. GOUGES

14.4.1 The station covers an area of about seven hectares, out of which four hectares are allocated to vegetable seed production and experiment, the remainder being under orchards and mulberry plantation. It lies at 1,020 ft above sea level and the soil is of the low humic latosolic type.

14.4.2 *Development*

Deroocking with broomwade has been carried out in an area of 3,250 m².

14.4.3 *Weather conditions*

The total rainfall recorded during the year amounted to 1259 mm as compared to 1552 mm the average normal.

14.4.4 *Cropping programme*

The programme was implementd.

14.4.5.1 Citrus — 407 holes were dug in the orchard and the following Mandarin seedlings were planted up to the end of the year in order to replace the uprooted, dead and diseased plants:

24 of the variety Ponkan, 12 of the variety Empress, 13 of the variety Garoet, 84 of the variety Poenten, 42 of the variety Fagan, 69 of the variety Local.

14.4.5.2 The citrus crop harvested was as follows:

Vangasailles (12,990 units), Grapefruits (47,195 units), Rangpur lime (10,000 units), Pamplemousses (166 units), Mandarins (985 units), Oranges (552.75 kgs), Tangelo (52.50 kgs).

Avocado — Part of the orchard has been cleared in order to start a new grass collection. Fruits harvested from the remaining trees amounted to 1,328.

14.4.6 *Foodcrops*

Manioc

The collection of varieties (1) Butter stick, (2) Paloma, (3) Yeyein, (4) Rodney, (5) De Table, (6) Icery, (7) Nestor, (8) Negrita — 15, (9) Negrita — 17, (10) Bitter, (11) Blanchite, (12) Desvaux, (13) De Table St. Martin, (14) Australia, (15) Manioc 29 (16) Manioc blanc, (7) Jaune Rempart, (18) Cassava beureum, (19) Singapore, (20) Jaune Trianon, was uprooted in June and replanted in July.

The manioc variety obtained from ITTA last year, was planted over an area of 440 m² in March for observation.

14.4.7 *Groundnut*

65 hectares were put under the variety local cabri during November for seed production.

14.4.8 The following were planted during the year:

Mustard cabbage variety Hamchoy, Cauliflower variety Gokhool, Beetroot variety Local, Sweet pepper variety Yolo Wonder, Tomato variety Marglobe, Chinese Radish (Rave), Celery cabbage (Petsai), Lettuce variety Mignonette, Cabbage variety Local, Sweet pepper variety Dunputh, Bean variety Noozinbee, Pomme d'amour, Cucumber variety white, Lettuce variety Tom Pouce, Bitter gourd variety Local, Pumpkin, Eggplant variety Cipaye, blanc, Calabash variety Natale, Snake gourd (Patole), Eggplant variety Farcie, Sponge gourd, variety Local, Squash variety Golden Custard, Watermelon variety Sugarbaby, Asparagus bean.

In addition various vegetables were planted for sale to the public and staff.

14.4.9 *Fodder*

The grass collection was maintained as usual.

14.4.10 *Disposal of produce*

The following were sent to Barkly Experiment Station for seed production:

Cowpeas 139 kgs dry pods, Lato 6,679 dry fruits, Bitter gourd 5,990 ripe fruits, Piment curry 131.250 kgs ripe fruits, Sponge gourd 9,175 dry fruits, Sweet pepper variety Dunputh 2,553 ripe fruits, Calabash variety Natale 501 dry fruits, Tomato variety Moneymaker 18.950 kgs ripe fruits, Avacadoes 899 ripe fruits, Rangpur lime 1.728 ripe fruits, Grapefruits 292 ripe fruits, Mandarin variety Local Flat 255 ripe fruits, Mustard cabbage variety Hamchoy 100.550 kgs dry seeds and thrash, Asparagus bean 121.7 kgs dry pods, Coffee variety K7, S.L 28 and S.L 34 — .750 kg, .800 kg and .250 kg respectively, Celery cabbage (Petsai) variety Distin 42.100 kgs dry seeds and thrash, Pomme d'amour local 406.700 kgs ripe fruits, Chinese radish (rave) 19.060 kgs dry seeds and thrash, Garlic variety Rodrigues 172.600 kgs, Garlic variety Feng Shan Sel No. 1 — 103.00 kgs, Garlic variety Pooning 37 kgs, Cauliflower variety Gohool .915 kg dry seeds and thrash, Beetroot variety Local 13.200 kgs dry seeds and thrash, Cucumber variety white 13,390 ripe fruits, Bean variety Norimbee 105 kgs drp pods, Lettuce variety mignonette 8.100 kgs uncleaned seeds, Cabbage variety local 3.385 kgs dry seeds and thrash, Lettuce variety Tom Pouce 1.719 kg uncleaned seeds, Bean variety Long Tom 26 kgs dry pods.

In addition 2,342 stecklings of Chinese radish (rave) have been sent to Richelieu Experiment Station.

Sale of produce during the year amounted to Rs 23,758.85.

BARKLY EXPPERIMENT STATION

SENIOR TECHNICAL OFFICER — L. C. M. LI TING WAI

14.5.1 *General*

Barkly Experiment Station is situated at an altitude of the 740 ft. above sea level in latitude 20° 13.3' and longitude 57° 27.2' and has an average rainfall of 1061 mm. per annum. The soil is shallow and rocky and is of the latosolic reddish prairie group.

14.5.2 *Development*

Work on the transfer of the existing potting shed to the new nursery are has started to enable a new store to be built.

14.5.3 *Weather Conditions*

The totoal rainfall recorded during the year 1978 amounted to 914.0 mm. average normal.

14.5.4 *Cropping Programme*

14.5.4.1 *Plant Propagation*

23,212 plants of various species of fruit trees and 14,506 units of various ornamental plants were produced and issued to sales section and other stations. In addition 109,400 soil blocks for seed production and experiments were issued on SF 12 to various stations. 50,500 soil blocks were used on the stations.

14.5.4.2 *Seed Production*

The seed production programmes was carried out according to the approved calendar. The following were planted:—

Radish, Rave blanche, Brère de chine Baton Blanc, Brède Kotachee, Salsifis (including stecklings), Lettuce mignonette, Bokla, Sweet pepper variety Chinese Giant, cauliflower local, Peas chinese, Peas local, Brède Martin, Petsai Distins, Beetroot stecklings, Bean Noorimbee, Carrot stecklings, Cotomili, Pomme d'amour, Brinjal variety Cipaye Narain, Cucumber white, Hot pepper cipaye, Yard long bean, Patole, Margoze CATT, Pipengaille local, Squash variety Golden Custard, Groundnut variety Cabri, Lalo, Tomato Marglobe, Tomato Venus VC, Lettuce Iceberg, Lettuce Merveille des quatre saisons.

14.5.4.3 The following were also planted in small quantities for seed production. Sweet peas variety Little marvel (from Egypt), Swisschard, Chinese lettuce.

14.5.5 *Manipulation Section*

After processing, 14,399.360 kgs of various seeds (Beans, Peas, Ground-nuts, Miscellaneous vegetable seeds etc.) were issued to seed store. 25,132 units and 8,111 kgs of seeds (ornamentals and fruits trees) were issued to nursery section for propagation. 2,058 units and 11,250 kgs of seeds which were unsuitable for propagation were sent to sales section.

The following were issued to other stations:—

Abercrombie Nursery (36,832 units and 3,411 kgs), Pamplemousses Experiment Station (8,750 units and 25.855 kgs), Central E.S. (0.500 kgs), Flacq D.C. (0.500 kgs), Government House, Reduit 1,000 kgs), Belle Vue Farm (255 units and 1,000 kgs), Livestock Feed Factory (3,500.000 kgs for milling), Agricultural Division (15.000 kgs), Mapou D.C. (50.000 kgs).

14.5.6 *Disposal of Produce*

(i) Items issued free to other stations:

		<i>Rs</i>
Plants 2,708 units ...	...	3,303 25
Seeds 3,748.821 kgs	...	32,710 16
		36,013 41

(ii) Items sold:

Plants 35,343 units	...	32,615 80
Seeds 10,716.062 kgs	...	167,402 50
Bulletins	...	229 00
Produce from crops	...	25,765 88
		226,013 18

In addition seeds worth Rs 14,609.00 were issued on SF 13 to the Ministry of Cooperatives and D.W.C. Plants worth Rs 675.00 were issued (on SF 13) to Ministry of Youth and Sports.

Produce worth Rs 249.65 was given free of charge to various institutions on the occasion of their fancy fairs.

PAMPLEMOUSSES EXPERIMENT STATION

SENIOR TECHNICAL OFFICER — F. LAM KEE

14.6.1 *Location*

Latitude 20° 06.3"

Longitude 57° 34.2"

Altitude 230 feet.

14.6.2 *Soil type*

Low humic latosols (Redit family). Fairly free from rocks. Good arable land, fairly flat, with a top-soil of approximately six inches.

14.6.3 *Area*

Approximately 10 acres or 4 hectares.

14.6.4 *Climate*

The average annual rainfall obtained for the nine years period 1964-1972 was 57.5 inches or 1,460.5 mm, most of which falls between December and April.

Cool dry winter, wet hot summer.

14.6.5 *Weather Conditions*

Rainfall registered for the year was 1,312.4 mm or 51.7 inches, which was about six inches below the nine years period average.

14.6.6 *Cropping programme*

14.6.6.1 The programme has been implemented.

The following were planted during the year:—

Groundnuts local cabri, Mustard cabbage, Hamchoy, Chinese radish (rave), Tobacco, Sweet pepper chinese giant, Celery cabbage (Petsai), Lettuce Mignonette, Peas local, Beans Long Tom, Beans Local Red, Chinese cowpeas, and Squash Golden Custard.

Beans planted at Pamplémousses Experiment Station suffered greatly from Halo Blight and Rust and two fields had to be discarded from seed production purposes.

Yield of tobacco was poor because of the incidence of Bacterial wilt. Average price obtained per kilo cured leaf was Rs 15.96.

The other crops had grown satisfactorily.

14.6.7 *Disposal of produce*

14.6.7.1 To Abercrombie Nursery, 4,892 potted plants for sale.

To Barkly Experiment Station, 7,298 potted plants for sale.

To Trunk Road, 269 potted plants for planting.

To Quatre Bornes D.C.O., 376 potted plants for sale.

To Field Services Division, 86 potted plants for planting.

14.6.7.2 *Sent o Barkly Experiment Station for seed*

Squash Golden Custard (400 units), Lettuce mignonette (9.5 kgs seed with thrash), Cowpeas pod (228.0 kgs), Beans Local Red (272.0 kgs), Peas local (192.0 kgs), Rave (Chinese radish) pods (91.25 kgs), Groundnuts Local Cabri (1,427.0 kgs).

14.6.7.3 *Sent to Livestock Feed Factory*

491.0 kgs Beans Long Tom, not suitable for seed production purposes, had been sent to the Livestock Feed Factory to be turned into animal feed concentrates.

14.6.7.3 *Sales*

"A guide to the Royal Botanic Gardens, Pamplémousses" (1,743 copies), Litchi fruits (14,100 units), Okra (228.5 kgs), Ginger (402.0 kgs), Chillies cipaye (99.5 kgs), Lettuce (2,527 units), Carrots (126.5 kgs), Groundnuts (161.5 kgs), Rave (Chinese radish) (1,456 units), Petsai (Celery cabbage) (352 units), Pipengaille (Sponge gourd) (107.0 kgs), Bergamotte (194 units), Bananas (173 units), Radish (48.25 kgs), Pamplémousses (40 units), Calabash (45.0 kgs), Coconuts (196 units), Cowpeas (35.5 kgs), Olives (60.0 kgs), Tobacco leaves (277.8 kgs).

14.6.8 Total revenue collected for the year was Rs 20,779.02.

Total revenue collected for the selling of "A guide to the Pamplémousses Gardens" booklets was Rs 11,981.00.

Total revenue collected for the selling of tobacco was Rs 4,439.02.

ROYAL BOTANIC GARDENS

SENIOR TECHNICAL OFFICER — F. LAM KEE

14.7.1 *Location*

Latitude 20° 06.3"

Longitude 57° 34.2"

Altitude 230 feet.

14.7.2 *Area*

Approximately 67 acres or 26.8 hectares.

14.7.3 *Climate*

The average annual rainfall obtained for the nine years period 1964-1972 was 57.5 inches or 1,460.5 mm, most of which falls between December and April.

Cool dry winter, wet hot summer.

14.7.4 *Weather conditions*

Rainfall registered for the year was 1,312.4 mm or 51.7 inches, which was about six inches below the nine years period average.

14.7.5 *Development*

Planting of indigenous trees suited to the Dry lowlands in the Section U2 of the Gardens, which had been reserved for that purpose, was continued. A memorial for the late Professor Abel de Smith was built by the Ministry of Works opposite the great water lily pond.

14.7.6 *General*

14.7.6.1 The Mon Plaisir House was given a fresh coat of paint. The roofs of the kiosks found in the Gardens were rethatched.

A total of 226 plants were planted in the Gardens during the year.

The practice of not allowing motor vehicles to enter the Gardens during Sundays and Public Holidays was maintained.

14.7.7 *Livestock*

23 stags—Eight males and 15 females.

Two males and two females were born during the year. One male was received from the Veterinary Services and one male wounded through fighting was sold through the Meat Authority.

25 Tortoises—six males, three females and sixteen young ones.

Three young tortoises were hatched during the year.

14.7.8 *Visits*

During the year, there were 410,432 visits made to the Gardens, (including 5,607 visits made by school children). Many persons might have paid more than one visit to the Gardens.

ABERCROMBIE NURSERY

SENIOR TECHNICAL OFFICER — F. LAM KEE

14.8.1 *Location*

Abercrombie Nursery is situated two miles from the centre of Port Louis at Terre Rouge. It supplies Port Louis and the districts of the North with plants.

14.8.2 *Soil type*

Low humic latosols of the Richelieu family.

14.8.3 *Area*

Approximately five acres.

14.8.4 *Climate*

The station is found in the sub humid zone with an annual rainfall of less than 50 inches. The average annual rainfall obtained for the ten year period 1964-1973 was 45.8 inches or 1,163.5 mm.

14.8.5 *Weather conditions*

Rainfall obtained for the year was 958.2 mm which was 205 mm short of the average of 1,163.5 mm for the 10 years period 1964-1973.

14.8.6 *Cropping programme*

The following crops were planted during the year: Bitter Gourd, Radish, Eggplant, Chillies carri, Tomato Marglobe, Chinese white cabbage, (Bred de chine Bouquet).

The main problem in the carrying out of the programme is the scarcity of irrigation water.

14.8.7 *Propagation programme*

Coconuts of the varieties Malayan dwarf Red and Malayan dwarf Yellow were from Malaysia in April and 3,176 of these nuts were sown at Abercrombie Nursery. Coconuts received from Pamplémousses Experiment Station and Palmar Livestock Breeding Station were also sown.

Budding was tried on Mango seedlings.

Seeds sown during the year: 49,000

Cuttings propagated during the year: 20,350

Layers and grafts: 460

Seedlings rooted cuttings potted during the year: 11,156

14.8.8 *Mango orchard*

The year under review seemed to be the "Off" year and yield of fruits was poor. Many fruits had been attacked by anthracnose.

Maison Rouge and Dauphinee fruits were kept for sowing purposes whilst the rest was sold to the staff and members of the public.

14.8.9 *Disposal of produce*

488 potted plants had been sent to the Trunk Road for planting

817 potted plants had been sent to Barkly E.S. for sale, 98 potted plants had been sent to Plaisance Experiment Station for planting

29 potted plants had been sent to Field Services Division for planting.

Sales

Fruit trees

Citrus Seedlings (4,189 units), Mango Seedlings, (1,896 units), Coconut Seedlings (4,772 units), Seedlings, others (5,153 units), Cuttings (882 units), Layers litchi (1,218 units) Grafts, citrus (40 units); Grafts, mango (64 units); Grafts, others (102 units):

Ornamentals

Seedlings (3,337 units), Cuttings (6,665 units), Layers and grafts (240 units).

14.8.10 *Sales*

Fruits and vegetables

Ripe mangoes (3,270 units), Green mangoes (88 units), Pawpaws (76 units), Grapes (10.0 kgs), Shallot (10.5 kgs), Dates (14.0 kgs), Okra (88.5 kgs), Brede de chine (16.0 kgs), Masson fruits (50. kgs).

Total revenue collected for the selling of plants was Rs 40,357.35

Total revenue collected for the selling of fruits and vegetables was Rs 2,380.93

Total revenue collected for the year was Rs 43,433.13

RICHELIEU EXPERIMENT STATION

SENIOR TECHNICAL OFFICER — Y. L. KONG TING LUN

14.9.1 *General*

The station is situated in the North West part of the Island at an elevation of 220 ft. above sea level. The climate is excessively dry, annual rainfall being in the region of 30" (750 mm) most of which falls in January, February and March. The soil is reddish and classified as Low Humic Latosol (Richelieu family).

14.9.2 *Weather conditions*

The climatic conditions throughout the whole year were satisfactory. The implementation of the cropping programme has been successfully carried out with the supply of irrigation water from La Ferme Reservoir.

The total rainfall recorded for 1978 amounted to 588.9 mm On the 20th and 21st January 1978, the island was visited by Cyclone 'Fleur'.

14.9.3 Cropping programme

The programme was implemented.

14.9.3.1 Tobacco

The crop grown in summer was mainly for seed production. The area planted and the quantity of seeds produced for each variety is given below:—

Variety	Type	Field No.	Area	Seed produced
NC 95	... flue cured	B2F1	0.83 hec.	13.5 kgs
SC 66	... flue cured	B4F8	0.62 hec.	2.25 kgs
YM	... flue cured	B4F8	0.20 hec.	2.1 kgs
Amarello	... flue cured	B4F8	0.25 hec.	3.5 kgs

A small quantity of seeds of the following varieties was also produced :

SC 71 (220 gms), SPG 33 (210 gms), Coker 347 (150 gms), SCR (120 gms), SC 72 (175 gms), Coker 86 (175 gms), SPG 28 (180 gms).

The second season started in August and ended in October. Area planted was 0.822 hectare NC 95.

The leaf quality for both crops was comparable to that of last year. Average price per kg of flue cured leaves obtained is Rs 15.10 whereas that for last year was Rs 15.17. Average price per kg of air cured leaf obtained is Rs 9.00 compared to Rs 8.90, the figure for last year. The fuel consumption amounted to 1,300 gallons of diesel oil and 25 steres of firewood at Rs 50 per stere. Thus the cost to produce one kg of flue cured leaf is Rs 1.42 whereas that for last year was Rs 2.18.

14.9.3.2 Groundnut

8.3 hectares of groundnut variety local cabri were planted for seed production. A fair crop is expected and will be harvested next year. Last year's planting was harvested and the yield was 2,123 kgs.

14.9.3.3 Maize

4.83 hectares of local maize were grown for seed production. The best cobs will be selected and sent to Barkly Experiment Station and the rest will be sold to Livestock Feed Factory.

14.9.3.4 Potato

Area planted was 1 hectare. Variety was "Up to date". The seeds were of very poor quality. Despite treatment of seeds and control of diseases by Topsin (.5 gm/litre) and control of wireworm by Dipterex (1.5 gm/1 lt) and red ants by Basudin (2 gm/litre), the yield was very poor indeed.

14.9.3.5 Canes

All sugar cane plantations (9.5 hectares) have been kept as fodder to be supplied to Livestock Breeding Section. 667.15 tons have been harvested and fed to the animals. Out of the 9.5 hectares, 1.75 hectares have been uprooted for tobacco plantation. However, another 0.4 hectare has been put under plantation where rice experiments are being conducted.

14.9.3.6 *Orchards*

Routine maintenance work was carried out in all orchards. The cultural operations such as weeding, pruning, irrigation and control of pest and diseases were done regularly. The mango fruits were sold by tender whereas the litchi fruits (a total of 22,124 units) were sold to staff and workers of the station.

14.9.3.7 *Vegetables Seed Production*

The production of vegetable seeds was carried out according to cropping programme. All produce was sent to Barkly Experiment Station and is listed in paragraph 'Disposal of Produce'.

14.9.4 *Disposal of Produce*

The sale of produce amounted to Rs 107,742.94.

TEA EXPERIMENT STATION

SENIOR TECHNICAL OFFICER — J. DINDOYAL

14.10.1 *Introduction*

The Tea Experiment Station is found along the main road from Curepipe leading to Quartier Militaire at an elevation of 1850 ft above sea level within the annual rainfall range of 3800 mm. The climate is rather cool and the average daily sunshine is of six hours. The soil is of Latosolic Brown Forest type.

14.10.2 An area of 68 arpents is under tea of which about seven arpents were used for experimental purposes.

14.10.3 *Development*

A lane of 250 ft has been paved. The doors and windows of the new labourers' mess have been fixed.

14.10.4 *Nursery*

The mother bushes (VP) were pruned to 25 ins and treated with M45 and Nuvacron.

14.10.5 *Weather Conditions*

The last four months of the year were very dry. On the other hand January, March and April were very wet months with precipitations of 437.90 mm and 570 mm respectively — totalling to themselves 1532 mm of the 2773 mm for the whole year, which was still below the normal of 3960 mm.

The wettest day of the year was 20th January with a precipitation of 165 mm.

14.10.6 Cropping programme

The total weight of green leaves harvested was 547,476½ kg — 9.6% less than last year's yield of 605,840½ kg.

The drop in yield was due mainly to unfavourable weather conditions prevailing during certain periods of the year especially during Marh-May.

14.10.7 The average yield of green leaves per arpent was 8051½ kg.

14.10.8 Table 3 — Average yield per arpent (½ kg.) for 1971 - 78 (annexed).

14.10.9 Table 4 — Field management (annexed).

14.10.10 Seeds Gardens: No seed was collected last year.

14.10.11 Disposal of Produce.

547,476½ of green leaves were sent to Dubreuil Tea Factory.

104,850 cuttings were issued free to the Tea Development Authority.

10,700 potted VP's were sold to the Tea Development Authority.

Visit

The Chief Agricultural Officer introduced Mr. Rosenquist, Consultant from Harison Flemings to the officers of the station on March 17th. The Divisional Scientific Officer (Agronomy) had a working session with Mr. Rosenquist from 17th to 22nd March 1978 concerning experimentation on station.

TABLE 1

TEA EXPERIMENT STATION

Weather Conditions

<i>Month</i>		<i>Rainfall mm</i>	<i>Temperature Min °F Max</i>		<i>% Relative Humidity</i>
January 78	...	437.90	67	81.4	87.8
February	...	175	66	83	85.9
March	...	525	64	77.7	86.5
April	...	570	65	78.6	90.5
May	...	95.75	64.4	72	86.1
June	...	203.75	59.9	71.7	87.3
July	...	214.25	58.9	63.7	84.3
August	...	179.25	56.5	69.3	83.5
September	...	75	60.5	73.5	80
October	...	97.75	59	74.5	77.6
November	...	124.00	60.1	73.6	82.9
December	...	75.50	64.2	77	79.3
Total	...	2,773.15	745.6	896	1,011.7
Average	...	231	62.1	74.6	84.3

TABLE 14.2
YIELD OF GREEN LEAVES IN HALF KG. FOR 1978

	1973		1974		1975		1976		1977		1978		
	Yield	%total	Yield	%total	Yield	%total	Yield	%total	Yield	%total	Yield	%total	
January	...	73,056	16.58	80,748	17.50	90,797	21.37	80,363	13.73	89,260	14.73	89,980	16.43
February	...	54,520	12.37	52,502	11.59	20,575	4.84	55,900	9.55	71,860	11.86	82,440	15.97
March	...	71,808	16.29	72,146	15.64	67,824	15.96	92,620	15.82	103,320	17.05	68,660	12.54
April	...	57,802	13.11	53,764	11.65	47,002	11.06	71,140	12.15	73,780	12.17	55,300	10.10
May	...	27,998	6.34	31,930	6.92	48,538	11.42	47,840	8.17	55,440	9.15	53,360	9.74
June	...	11,766	2.66	11,684	2.53	18,834	4.43	30,880	5.27	21,920	3.61	9,600	1.75
July	...	3,758	0.85	4,658	1.01	5,544	1.30	12,080	2.06	7,220	1.19	—	—
August	...	4,924	1.09	2,330	0.50	4,602	1.08	5,252	0.89	—	—	2,738	.50
September	...	9,390	2.17	10,082	2.19	4,120	0.96	11,940	2.04	11,460	1.89	36,268	6.62
October	...	41,782	9.47	34,066	7.39	28,900	6.80	39,760	6.79	40,240	6.64	28,956	5.10
November	...	36,226	8.22	39,534	8.57	38,200	8.99	57,200	9.77	52,740	8.70	58,416	10.66
December	...	42,866	10.85	67,950	14.52	49,886	11.74	80,300	13.72	78,600	12.97	61,758	11.28
Total	...	440,788		461,389		424,812		585,275		605,840		547,476	

TABLE 3

AVERAGE YIELD PER ARPENT ($\frac{1}{2}$ kg) FOR 1971-1978

<i>Year</i>	<i>Yield</i>
1971 ...	6,514
1972 ...	5,921
1973 ...	6,320
1974 ...	6,615
1975 ...	6,091
1976 ...	8,607
1977 ...	8,909
1977 ...	8,051

TABLE 4

FIELD MANAGEMENT

<i>Field No.</i>	<i>Acreage</i>	<i>1976</i>	<i>1977</i>	<i>1978</i>
1	3.05	Unprune	Unprune	Prune
2	3.98	Unprune	Unprune	Prune
3	2.86	Deep skiff	Prune	Unprune
4	4.73	Prune	Unprune	Deep skiff
5	2.40	Unprune	Deep skiff	Prune
6	3.32	Unprune	Deep skiff	Prune
7	3.96	Deep skiff	Prune	Unprune
8	5.26	Deep skiff	Prune	Unprune
9	3.29	Deep skiff	Prune	Unprune
10	2.43	Deep skiff	Prune	Unprune
11	2.44	Deep skiff	Prune	Unprune
12	3.87	Light skiff	Unprune	Light skiff
13	1.22	Unprune	Deep skiff	Prune
14	4.93	Deep skiff	Prune	Unprune
15	3.26	Deep skiff	Prune	Unprune
16	3.59	Unprune	Unprune	Prune
17	3.40	Unprune	Unprune	Prune
18	2.69	Light skiff	Deep skiff	Prune
19	2.63	Unprune	Deep skiff	Prune
20	0.90	Unprune	Unprune	Light skiff

Appendix 14.A

METEOROLOGICAL DATA

CUREPIPE EXPERIMENT STATION

Hereunder the rainfall recorded for 1978—Compared to the average of the past 14 years.

<i>Month</i>	<i>Average (1964-1977) mm</i>	<i>1978/mm</i>
January ...	476.9	488.2
February	400.2	165.0
March ...	450.0	486.0
April ...	451.7	649.8
May ...	330.5	120.4
June ...	247.3	196.5
July ...	240.6	209.3
August ...	250.3	217.3
September ...	164.2	75.0
October ...	150.0	82.9
November ...	108.4	122.5
December ...	350.7	117.6
		2,930.5

PLAISANCE EXPERIMENT STATION

Hereunder is the rainfall record for 1978:—

<i>Month</i>	<i>Rainfall in mm</i>
January ...	206.3
February ...	119.9
March ...	178.5
April ...	393.2
May ...	61.2
June ...	82.3
July ...	143.0
August ...	72.1
September ...	29.4
October ...	30.5
November ...	159.6
December ...	41.0

CENTRAL EXPERIMENT STATION

RAINFALL — MONTHLY TOTAL (MM) AND DIFFERENCE FROM NORMAL

<i>Month</i>	<i>Rainfall</i>	<i>Average normal</i>	<i>Difference from normal</i>
January ...	250	289	— 39
February ...	120	268	— 148
March ...	127	277	— 150
April ...	314	138	+ 176
May ...	52	83	— 31
June ...	76	82	— 6
July ...	82	78	+ 4
August ...	40	59	— 19
September ...	42	59	— 17
October ...	24	39	— 15
November ...	82	74	+ 8
December ...	50	207	— 157
TOTAL ...	1259	1552	— 293

BARKLY EXPERIMENT STATION

<i>Month</i>	<i>Actual (mn)</i>	<i>Average normal (mn)</i>
January ...	53.5	128
February ...	25.0	242
March ...	169.0	128
April ...	321.0	79
May ...	27.0	77
June ...	60.0	39
July ...	49.5	24
August ...	20.0	31
September ...	45.0	20
October ...	15.0	13
November ...	69.0	17
December ...	60.0	87
	914.0	885

ROYAL BOTANIC GARDENS

<i>Month</i>		<i>Rainfall (mm)</i>	<i>Average for the 9 years period 1964-1972</i>
January	...	175.5	244.6 mm
February	...	51.8	174.6
March	...	119.9	241.8
April	...	297.9	156.2
May	...	61.7	80.0
June	...	112.5	82.8
July	...	136.4	106.9
August	...	80.0	90.7
September	...	57.2	51.3
October	...	85.3	46.0
November	...	63.5	70.6
December	...	53.1	95.6

ABERCROMBIE NURSERY

<i>Month</i>		<i>Rainfall (mm)</i>	<i>Average for the 10 years period 1964-1973</i>
January	...	111.5	257.8
February	...	32.2	134.0
March	...	90.6	189.6
April	...	354.0	118.0
May	...	47.0	57.3
June	...	57.4	57.3
July	...	83.4	61.9
August	...	22.8	53.1
September	...	41.4	27.4
October	...	39.5	30.2
November	...	52.4	60.8
December	...	26.0	116.7

Appendix 14. B**MANIPULATION SECTION**

<i>Item</i>	<i>Amount received</i>	
Bean ...	13,200.550	kgs rough clean seeds
Beetroot ...	71.950	kgs thrash
Bitter gourd ...	4,311	units fruits
Broad bean ...	621	kgs pods
Cabbage ...	178.985	kgs thrash
Calabash ...	1,177	units fruits
Celery cabbage ...	273.950	kgs thrash
Chinese white cabbage ...	509.200	kgs thrash
Chinese spinach ...	1,012	kgs thrash
Chilly ...	398.791	kgs fruits
Chinese radish ...	2,336.115	kgs thrash
Coriander ...	2,189.300	kgs thrash
Cowpeas chinese ...	421.700	kgs pods
Cucumber ...	16,138	units fruits
Cauliflower ...	78.055	kgs thrash
Eggplant ...	18,528	units fruits
Groundnut ...	9,121	kgs rough clean seeds
Lettuce ...	19.665	kgs trash
Mustard cabbage ...	208.621	kgs thrash
Okra ...	430.500	kgs pods
Onion ...	12.600	kgs thrash
Pea ...	2,194	kgs rough clean seeds
Pomme d'amour ...	10,915.934	kgs fruits
Pumpkin ...	139	units fruits
Radish ...	21.200	kgs thrash
Salsify ...	0.037	kgs rough clean seeds
Snake gourd ...	1,956	units fruits
Sponge gourd ...	8,842	units fruits
Squash ...	1,619	units fruits
Sweet pepper ...	6,173	units fruits
Tomato ...	2,017.900	kgs fruits
Wetermelon ...	3,241	units fruits
Yard long bean ...	165.600	kgs pods

APPENDIX 14C

Seeds Issued 1978

<i>Crop</i>	<i>Varieties</i>	<i>Issued free to stations and demonstration centres in Kgs</i>	<i>Sold at BES in Kgs</i>	<i>Total in Kgs</i>
Bean — Haricot	Long Tom, Local Red, Poineer	977.065	3,216.100	4,193.165
Beetroot — Betrave	Local	1.970	15.054	17.024
Bitter gourd — Margoze	Local, CAM, CATT	3.585	17.870	21.455
Broad bean — Bokla	Local	58.550	76.395	134.945
Cabbage — Chou	Local	1.810	19.623	21.433
Calabash	Natal	3.628	47.185	50.813
Chinese white cabbage — (Brede de Chine)	Baton Blanc, Bouquet	3.029	76.970	79.999
Chinese spinach — Brede	Kotachee (Malabar), Martin, Palak	2.724	236.335	239.059
Chilly — Piment	Cipaye, Carri	1.009	10.371	11.380
Celery cabbage — Petsai	Distins	0.737	4.215	4.952
Chinese radish — Rave	Morocco	5.480	48.535	54.015
Coriander — Cotomili	White	80.635	1,032.500	1,113.135
Cowpeas chinese — Voehm	Local	6.300	119.420	125.720
Cucumber — Concombre	Local	4.105	105.780	109.885
Cauliflower — Choufleur	Cipaye Narain, Rosita, Farcie	1.571	18.706	20.277
Eggplant — Bringelle	Local cabri	1.006	12.820	13.826
Groundnut — Pistache	Mignonette, Sucrine, Tom Pouce, Webbs, Wonderful, Mer- veilles des Quatre Saisons, Iceberg, Craquant d'Eculy,	2,194.500	4,579.250	6,773.750
Lettuce — Laitue	Blonde d'ete, Reine des Glaces	1.261	9.856	11.117
Mustard cabbage — Brede de Chine	Frisee, Salee, Hamchoy	6.353	52.300	58.653
Okra — Lalo	Local	2.732	58.495	61.227
Pea — Petit pois	Local, Chinese	222.600	893.250	1,115.850
Pumpkin — Giraumon	Giant Globe	2.635	80.770	83.405
Pomme d'amour	Local, CATT	1.611	53.414	55.025
Radish — Radis	Chinese Giant, Dunpath	1.455	9.230	10.685
Salsify — Saisifs	Golden Custard	0.020	0.600	0.620
Sponge gourd — Pipengaille	Marglobe, Moneymaker	5.500	54.325	59.825
Snake gourd — Patole	Sugarbaby	1.725	24.355	26.080
Sweet pepper — Poivron	...	1.133	8.081	9.214
Squash — Patisson	...	2.787	45.369	48.156
Tomato — Tomato	...	0.061	1.026	1.087
Watermelon — Melon d'eau	...	2.135	43.825	45.961
Yard long bean	...	2.647	8.390	11.037

APPENDIX 14D

Plant Propagation 1978—Sales & Free Issues

	Ornamentals				Fruit Trees									
	Seed- lings	Cuttings	Layers	Grafts	Citrus Seed- lings	Mango Seed- lings	Misc. Seed- lings	Cuttings	Letchi layers	Misc. layers	Citrus Grafts	Mango Grafts	Misc. Grafts	Coconut Seedlings
Abercrombie Nursery ...	3,337	6,665	24	—	4,189	1,896	5,153	882	1,218	—	40	64	64	4,772
Barkly E. S. ...	5,247	12,535	381	105	6,167	2,297	6,803	1,036	2,186	55	435	415	415	831
Richelieu R. S. ...	—	—	—	—	—	—	—	—	—	—	—	—	—	2,933
	8,582	19,200	405	105	10,356	4,193	11,956	1,918	3,404	55	475	479	479	8,536
Sales					Seedlings	Cuttings		Grafts		Layers		Coconuts Seedlings	Total	
Barkly E. S. ...	...	...	...	...	20,512	13,571		1,266		2,622		831	38,802	
Abercrombie Nursery	...	...	...	...	14,575	7,547		406		1,218		4,772	28,518	
Richelieu E. S. ...	...	...	...	...	—	—		—		—		2,933	2,933	
	TOTAL	...	...	...	35,087	21,118		1,672		3,840		8,536	70,253	
											Free issues Pamplermousses E. S.	...	731	
											Free issues Abercrombie Nursery	...	1,432	
											GRAND TOTAL	...	72,416 units	

XV. Livestock Breeding Stations

HEAD OF DIVISION: Y. AUMJAUD, AGRICULTURAL SUPERINTENDENT

15.1. This Division is made up of four stations viz (i) Curepipe Livestock Breeding Station, (ii) Richelieu Livestock Breeding Station, (iii) Palmar Livestock Breeding Station and (iv) Poultry Breeding Centre.

15.2 *Curepipe Livestock Breeding Station*

15.2.1. *Milch cattle*

At the end of the year 1978, the Curepipe Livestock Breeding Station carried a total of 210 head of milch cattle—6 sires, 26 young bulls, 7 bull-calves, 96 cows, 69 heifers and 6 heifer-calves. There were 82 calvings during the year—35 males and 47 females. The average birth weight was 30.9 kg and the average weaning weight at 90 days was 68.1 kg. The number of calves weaned during the year were 41 males and 47 females.

Sale : 30 young bulls, 2 pregnant cows and 2 heifers were sold for breeding. 2 bulls and 15 cows were sold for slaughter through the Mauritius Meat Authority.

Death : 1 young bull, 2 bull-calves and 3 heifer-calves died during the year.

Transfer: 7 young creole bulls and 25 heifers were transferred to Richelieu Livestock Breeding Station.
16 cows were transferred to Palmar Livestock Breeding Station. 9 cows were transferred to Richelieu Livestock Breeding Station.

15.2.2 *Milk Production*

Over a lactation period of 305 days, the average production was 6.8 kg of milk per head per diem. The first calvers yielded an average of 5.7 kg per head per diem; the best performer yielded 6.1 kg with a peak of 11.0 kg. Second calvers yielded an average of 6.2 kg per head per diem; the best performer yielded 6.6 kg with a peak of 12 kg. Third calvers yielded an average of 7.2 kg per head per diem; the best performer yielded 9.1 kg with a peak of 17.5 kg. Cows with more than three calvings gave an average of 8.1 kg per head per diem; the best performer yielded 11.3 kg with a peak of 14.1 kg.

15.2.3 The Experiment—“Effect of two methods of restricted suckling on performance of the cows and on growth rate of the calves” which started in September 1977 continued up to the end of April 1978. The cows which were under this Experiment were milked only once a day till the end of their lactation period.

15.2.4 The total quantity of milk produced during the year was 129,399.6 litres, out of which 25,420.0 litres were fed to calves, piglets and rabbitlings, 78,467.0 litres were sold to Hospitals, 18,300 litres were sold to contractor, 6517.0 litres were sold to staff, 417.1 litres were discarded due to mastitis and 278.5 litres were sent for analysis.

15.2.5 *Pigs*

At the end of the year, the total number of pigs at the station was 41 — 3 boars, 10 sows, 6 gilts and 22 piglets. 154 piglets were farrowed with an average of 9 piglets per litter. The average birth weight of piglets was 1.45 kg. During the year 17 litters were recorded; 16 litters were weaned with an average of 6 piglets per litter. The average weaning weight at 8 weeks old was 14.1 kg per piglet.

Sale : 2 young boars and 6 sows sold for slaughter.

82 pig-weaners were sold to the Pig Credit and Marketing Co-operative Society for distribution to its members.

4 females weaners were sold to the Prisons Department for breeding.

Death : 1 sow and 63 piglets died during the year.

Transfer: 1 young boar was transferred to Palmar Livestock Breeding Station.

15.2.6 *Rabbits*

At the end of the year the total number of rabbits was 169 — 26 bucks, 34 does, 17 young bucks, 15 young does and 77 rabbitlings. There were 77 kiddings during year yielding a total of 314 rabbitlings.

Sale : 93 rabbits were sold to small breeders and 35 rabbits unfit for breeding were sold for slaughter.

Death : 28 males, 24 females and 83 rabbitlings.

Transfer: 6 bucks were transferred to Palmar Livestock Breeding Station. 2 bucks and 2 does were issued to Flacq Demonstration Centre. 4 young does were issued to the Plant Pathology Division and one doe to the Division of Veterinary Services.

15.2.7 *Manure*

The total quantity of manure delivered from the station was 1,554.7 tons; out of which 1,142.9 tons were collected by the Experiment Stations of the Ministry and 411.8 tons were sold to the Development Works Cooperation and a few farmers.

15.3. *Richelieu Livestock Breeding Station*

15.3.1. *Milch Cattle*

At the end of the year the Richelieu Livestock Breeding Station carried a total of 578 head of milch cattle — 204 cows, 181 heifers, 80 heifer-calves, 4 sires, 42 bulls and 59 bull-calves. There were 165 calvings during the year — 93 females and 72 males, and 7 cases of abortion were recorded. The average birth weight was 28.7 kg and the average weaning weight at 90 days was 76.5 kg. The number of calves weaned during the year was 67.

Sale : 10 cows, 4 heifers and 6 bulls were sold for slaughter through the Mauritius Meat Authority.

Death : 7 cows, 6 young heifers and 39 calves died during the year. 4 still-born were also recorded.

Transfer: 25 young heifers, 7 young bulls and 1 sire were received from Curepipe Livestock Breeding and Palmar Livestock Breeding Stations. 1 cow and 1 heifer-calf were collected from cow-keepers of the Rural Development Project. 9 cows were transferred to Curepipe Livestock Breeding Station; they could not be kept in herd as they were stealing milk.
3 sires were transferred to Division of Veterinary Services.

15.3.2 *Sahiwal Cattle*

At the end of the year there were 28 head of sahalwal cattle on the station consisting of 11 cows, 6 heifers, 4 heifer-calves, 2 sires, 4 bulls and 1 bull-calf. There were 7 calvings the year — 6 females and 1 male.

Sale : 1 cow was sold for slaughter.

Transfer: 2 sires were donated to the Republic of Seychelles.

15.3.3 *Milk Production*

During the year 177,311.40 litres of milk were produced, out of which 16,644.4 litres were fed to calves, 43,772.0 litres were sold to Civil and Brown Sequare Hospitals, 94,340.0 litres were sold to Contractors, 20,790.4 litres were sold to staff, 1,133 litres were transferred to Curepipe Livestock Breeding Station, 70.40 litres were issued to the Dairy Chemistry Division. The loss of milk occurred through decantation and handling for the year amounted to 403.3 litres and 110.90 litres were discarded due to mastitis.

15.3.4 *Development*

At the beginning of the year cows in milk were transferred to the first Wing of the Dairy Feedlot.

The Milk Parlour and Milk Room were also completed and the 8 clusters Hyline type milking machine was installed by the Supplier's Engineer. The Parlour became functional on the 15th March 1978.

The Maternity and bull-pen were completed and were being used as from the middle of the year. Work on the second wing of the Dairy Feedlot was continuing and by the end of the year separation walls, feed, water and molasses troughs were completed. However, the roof structures and gates were left to be made and cast in position.

The construction of the weighbridge unit was nearly completed—and the following works were yet to be completed: windows to be fixed excavation work for the weighbridge.

15.4 *Palmar Livestock Breeding Station*

15.4.1 *Milch Cattle*

At the end of the year 1978, the Palmar Livestock Breeding Station carried a total of 438 head of cattle—9 sires, 2 bulls, 48 bull-calves, 140 cows, 133 heifers and 106 heifer-calves. There were 107 calvings during the year—52 males, 45 females and 100 still-born. Two cases of abortion were also recorded. The average birth weight was 21.0 kg and the average weaning weight at 90 days was 60 kg.

Sals : 15 bulls, 50 young bulls, 81 cows and 33 heifers were sold for slaughter. 24 heifer-calves and 134 bull-calves were sold to small breeders.
during the year.

Death : 1 bull, 3 young bulls, 7 cows, 5 heifers and 21 calves died

Transfer: 55 calves and 20 cows were collected from cow-keepers of the Rural Development Project and 25 pregnant cows were issued to cow-keepers in the same project. 16 cows were received from Curepipe Livestock Breeding Station. One Friesian Sire was transferred to Richelieu Livestock Breeding Station.

15.4.2 *Herd Cattle*

At the end of the year there were 56 head of Ongole, 46 head of Boran and 298 head of Zebu cattle. The herd consisted of 8 sires, 55 bulls, 39 young bulls, 31 bull-calves, 163 cows, 77 heifers and 27 heifer-calves. There were 111 calvings during the year—55 males and 56 females.

Sale : 6 cows and 3 calves were sold for breeding.

Death : 1 cow and 16 calves died during the year.
22 bulls were sold to carters; 15 bulls, 13 cows and 9 heifers were sold for slaughter.

15.4.3 *Goats*

(a) Anglo-Nubian

At the end of the year there were 253 Anglo-Nubian goats on the Station—82 males and 171 females. 157 kids were born during the year—72 males and 85 females. The average weight at birth was 2.1 kg and the

average weaning weight was 16.3 kg at 120 days. 2 does aborted and 11 still-born were recorded during the year.

Sale : 15 does, 4 males and 1 duck were sold for slaughter; 5 males and 3 females were sold for fattening.

Death : 28 kids, 11 weaners and 3 does died during the year.

Transfer: 34 young bucks and 18 young does were transferred to the Extension Services Division for sale to breeders.

15.4.4 (b) *Jumna-Pari*

At the end of the year there were 128 Jumna-Pari goats on the Station—45 males and 83 females. 77 kids were born during the year—43 males and 34 females. The average birth weight was 2.3 kg and the average weaning weight was 16.5 kg at 120 days. 1 still born was recorded.

Sale : 12 does, and 9 males were sold for slaughter and 1 male was sold for fattening.

Death : 6 kids, 2 weaners and 3 does died during the year.

Transfer: 1 sire, 13 young bucks and 10 young does were transferred to the Extension Services Division for sale to breeders. 1 old sire was returned from the Flacq Demonstration Centre.

15.4.5 *Sheep*

12 sheep imported from Rodrigues were received on the Stations in October after having gone through the Quarantine at Roche Bois. The herd consisted of 2 rams, 8 ewes and 2 lambs. By the end of the year, 1 birth was recorded.

15.4.6 *Pigs*

At the end of the year there were 178 pigs of Large White, Wessex Saddle Back and their crosses at the Station, consisting of 2 boars, 5 young boars, 16 sows, 28 gilts and 227 piglets. During the year 71 litters were recorded giving a total of 688 piglets. The average number of piglets per litter was 9.7. The average weaning weight was 15.0 kg.

Sale : 14 sows, 3 gilts and 1 boar were sold for slaughter. 428 weaners were sold to the Pig Credit and Marketing Co-operative Society, and 1 boar was sold for breeding.

Death : 180 piglets died during the year.

Transfer: 1 boar was received from Curepipe Livestock Breeding Station.

15.4.7 *Rabbits*

The small rabbit unit was maintained. At the end of the year the Station carried a total of 29 rabbits—7 bucks, 9 does and 13 rabbitlings. During the year 32 rabbitlings were born and 4 still-born were recorded.

Sale : 5 males and 5 females were sold to breeders. 7 males unfit for breeding were sold for slaughter.

Death : 2 does, 2 bucks and 21 rabbitlings died during the year.

Transfer: 4 males were issued to the Animal Health Laboratory of the Division of Veterinary Services.

15.4.8 *Milk Production*

During the year 73,845.5 litres of milk were produced; out of the total milk produced 33,061.9 litres were fed to calves, kids and piglets, 18,941.5 litres were sold to Staff, 21,699.6 litres were sold to the Flacq Hospital. The loss of milk occurred through handling was 82.5 litres and 60 litres were discarded due to mastitis.

15.4.9 *Development*

The first wing of the Dairy Unit had been completed and gates fixed. On the second wing work was progressing, trusses had been cast in position and partition walls completed, but not yet plastered. The following works were yet to be completed: purlins to be prepared, slats to be made and fixed in position; feed and water troughs to be made; gates to be made and fixed; drain to be connected.

The construction of the Milk Parlour and the Milk Room which started at the beginning of the year was completed and the 8 clusters Hyline type milking machine was installed by the Supplier's Engineer; it became operational on the 13th of August 1978.

The construction of the Maternity pens and Bull pens were also started during the year and are nearing completion.

15.4.10 *Miscellaneous*

During the year, manure was sold to the Public and the Development Works Corporation; by the end of the year 2,098.020 tons were sold and 187.320 tons were issued to other Divisions of the Ministry.

To increase the fodder produced on the station, 13 arpents of Elephant grass and about half arpent of Accacia were planted.

2,787 coconuts were selected and sent to Abercrombie Nursery for seedlings production and 752 coconuts were culled and sold to the Staff.

A contract for the exploitation of the coconut orchards was awarded during the middle of the year to a contractor for a period of 3 years.

15.5 *Poultry Breeding Centre, Reduit*

15.5.1 The Poultry Breeding Centre maintained parent stock Ross Ranger and Ross Tint for the production of Layers and Ross I Broiler Parent stock for the production of broiler chicks, all from Ross Breeders Limited.

15.5.2 During the year the Poultry Breeding Centre hatched a total of 170,525 chicks. 60,365 day-old pullets and 7,711 month-old pullets for the production of eggs were sold to Poultry keepers.

15.5.3 To help the production of poultry meat 21,815 day-old broilers and 72,713 day-old and month-old male chicks from laying stock were sold. 3,617.43 kg of dressed chickens and culls and 9,500 kg of live chickens were sold for table. The Centre also provided 81 chicks to the Animal Health Laboratory.

15.5.4 *Hybrid Ross Ranger*

A total of 98,679 Hybrid Ross Ranger chicks were produced of which 41,330 day-old pullets, 4,540 month-old pullets, 49,847 day-old cockerels and 203 month-old cockerels were sold.

15.5.5 *Hybrid Ross Tint*

A total of 47,098 Hybrid Ross Tint were produced of which 19,035 day-old pullets, 3,171 month-old pullets, 22,617 day-old cockerels and 46 month-old cockerels were sold.

15.5.6 *Broiler Chicks*

24,748 day-old broilers were produced during the year, of which 21,815 were made available to small poultry keepers.

15.5.7 *Egg Production*

During the year 328,812 eggs were produced at the Poultry Breeding Centre. The monthly production of the various breeds maintained during the year was as per Appendix "A".

15.5.8 Out of the 328,812 eggs produced and the 2,255 eggs carried forward from the year 1977, 16,363 were sold for table, 257,401 were incubated for the production of chicks, 2,963 eggs were issued to the Animal Health Laboratory, 2,520 eggs to the Artificial Insemination Laboratory, 2 eggs were issued to the Entomology Division; 45,925 eggs to the Ministry of Health, and 1,071 eggs, sizeless and cracked, unfit for consumption were destroyed. The stock in hand at the 31st December 1978 was 4,822 eggs.

15.5.9 *Reproductive Performance*

During the year under review 170,525 chicks were hatched. The average fertility and hatchability were 85.87% and 69.19% respectively.

The monthly reproduction performance of all breeds maintained at the Centre was as per Appendix "B".

The monthly reproductive Performance of all parent stock, breedwise, was as per Appendix "C".

15.5.10 *Import of Parent Stock*

To meet the demand for layers for the next season the following were imported from the United Kingdom.

- (i) Ross Ranger Parent Stock: 1,439 day-old pullets and 222 day-old cockerels
- (ii) Ross Tint Parent Stock: 617 day-old pullets and 105 day-old cockerels.

For the production of broiler chicks 611 day-old Ross 1 day-old Parent stock pullets and 96 day-old cockerels were imported.

15.5.11 *Animal Health*

The Poultry Breeding Centre carried an average of 14,420 birds of all ages on a monthly basis. The mortality in the adult stock during the year was 8.7% and in the group 0-12 weeks the mortality was 7.16%.

15.5.12 *Development*

The office-cum-store building was handed over by the Engineering Division and it was occupied as from February 1978.

At the end of October, the hatchery, eight breeding houses and four brooding houses were handed over by the Contractor.

The two new Nova-Buckeye incubators received were erected in November by the supplier's Engineer and were immediately put into use. The staff was being trained to run the incubators efficiently.

APPENDIX A

Record of Monthly Egg Production 1978

Month			<i>P.S. Ranger</i>	<i>P.S. Tinted</i>	<i>P.S. Ross Broiler</i>	<i>Mixed hybrid</i>	<i>Total</i>
January	...	...	6,830	2,999	3,746	2,469	16,044
February	...	...	13,926	6,875	3,192	2,236	26,229
March	...	...	17,886	8,782	3,076	2,456	32,200
April	...	...	16,638	7,821	2,003	2,141	28,603
May	...	...	18,178	9,228	2,526	2,327	32,259
June	...	...	16,847	9,176	2,589	2,071	30,683
July	...	...	16,509	9,139	1,220	2,001	28,069
August	...	...	15,337	8,544	505	1,721	26,107
September	...	...	13,972	7,728	4,764	1,537	28,001
October	...	...	13,663	7,541	5,794	1,326	28,324
November	...	...	12,323	6,772	4,992	3,065	27,152
December	...	...	11,021	5,975	3,814	3,531	24,341
TOTAL			173,130	90,580	38,221	26,881	328,812

APPENDIX B

Monthly Reproductive Performance

Month			<i>No. of eggs set</i>	<i>No. Fertile</i>	<i>No. of chicks hatched †1,606</i>	<i>% of Fertility</i>	<i>% hatched of fertile</i>	<i>% hatched of all eggs set</i>
January	...	...	5,881	4,809	3,457	81.77	71.88	58.78
February	...	...	20,107	16,664	13,034	82.87	78.21	64.82
March	...	...	23,002	19,767	16,435	85.93	83.14	71.45
April	...	...	22,920	20,001	16,491	87.26	82.45	71.95
May	...	...	28,287	24,805	20,513	87.69	82.69	72.51
June	...	...	22,079	19,547	16,851	88.12	86.60	76.32
July	...	...	21,814	19,219	16,021	88.10	83.36	73.44
August	...	...	26,086	22,633	18,394	86.76	81.27	70.51
September	...	...	21,493	18,475	14,394	85.95	77.91	66.97
October	...	...	26,456	22,432	17,227	84.78	76.79	65.11
November	...	...	20,857	17,112	12,625	82.04	73.77	60.53
December	...	...	*13,273 5,146	4,262	3,477	82.82	81.58	67.56
TOTAL			257,401	209,636	170,525	85.87	80.57	69.19

*Set in December 1978, chicks hatched in January 1979.

†Set in December 1977, chicks hatched in January 1978.

APPENDIX C

The Monthly Performance of All Parent Stock Breedwise for Year 1978

Month 1978	P. S. Ranger					P. S. Tinted					P. S. Ross Broiler				
	No. of eggs set	No. fer- tile	No. of chicks hatched	% Ferti- lity	% Hat- ched	No. of eggs set	No. fer- tile	No. of chicks hatched	% Fer- tility	% Hat- ched	No. of eggs set	No. fer- tile	No. of chicks hatched	% Fer- tility	% Hat- ched
January	1,017	726	563	71.38	77.54	712	528	387	74.15	73.29	4,152	3,555	2,507	85.62	70.52
February	11,167	9,135	7,253	81.80	79.39	5,877	4,944	4,040	84.12	81.71	3,063	2,585	1,741	84.39	67.35
March	15,218	12,987	11,129	85.33	85.69	5,142	4,561	3,832	88.70	84.01	2,642	2,219	1,474	83.98	66.42
April	14,876	12,892	10,726	86.66	83.19	6,063	5,473	4,708	90.26	86.02	1,981	1,636	1,057	82.58	64.60
May	19,181	16,658	13,869	86.84	83.25	6,558	6,007	5,161	91.59	85.91	2,548	2,140	1,483	83.98	69.29
June	14,906	12,988	11,274	87.13	86.80	4,881	4,462	3,953	91.41	88.59	2,292	2,007	1,624	87.56	80.91
July	14,109	12,175	10,035	86.29	82.42	6,459	5,962	5,204	92.30	87.28	1,246	1,082	782	86.83	72.27
August	16,643	14,177	11,339	85.18	79.98	9,443	8,456	7,055	89.54	83.43	—	—	—	—	—
September	11,944	9,894	7,408	82.83	74.87	5,806	5,110	3,988	88.11	78.04	3,743	3,471	2,998	92.73	86.37
October	14,354	11,522	8,330	80.27	72.29	5,804	4,919	3,880	84.75	78.87	6,298	5,991	5,017	95.12	83.74
November	10,290	7,802	5,193	75.82	66.55	5,990	5,050	3,893	84.30	77.08	4,577	4,260	3,539	93.07	83.07
December	77,058 2,620	2,032	1,560	77.55	76.77	23,802 1,452	1,210	997	83.33	82.39	22,413 1,074	1,020	920	94.97	90.19
TOTAL	153,383	122,988	98,679	84.05	80.23	67,989	56,682	47,098	88.30	83.09	36,029	29,966	24,748	89.14	77.22

*Eggs Set in December 1978, chicks hatched in January 1979.

†Eggs Set in December 1977, chicks hatched in January 1978.

XVI. Engineering Division

HEAD OF DIVISION: A. R. SATAR, PRINCIPAL AGRICULTURAL ENGINEER

16.1 The division consists of 3 sections :—

- (i) Farm Machinery
- (ii) Farm Building
- (iii) Irrigation, Soil & Water Conservation & Drainage

16.2 The Farm Machinery section is responsible for the design of Agricultural Equipment, testing of imported equipment and carrying out modifications if necessary and advise other divisions on the choice of equipment. Repairs and maintenance of all vehicles and equipment, manufacture of structural members for farm building and furniture are carried out in the workshop. This section is also responsible for the installation of all equipment on experimental stations and pumps and piping systems for the Irrigation Section.

16.3 The Farm Building Section is responsible for the design and construction of farm and office buildings.

16.4 The Irrigation, Soil & Water Conservation and Drainage Section is responsible for research and design in the field of irrigation, soil and water conservation and drainage. This section has carried out the design of irrigation systems for the Small Scale Irrigation Scheme and advises the Project Implementation Division on all technical aspects of the Northern Plains and Western Coastal Plains Irrigation Schemes.

16.5 Farm Machinery Section

The number of vehicles and equipment and their maintenance and repairs were as follows :—

Item	Number at 31.12.77	Addition during 1978	Deletion during 1978	Existing on 31.12.78	Servicing and Repairs
Lorry ...	17	Nil	Nil	17	335
Van ...	20	Nil	Nil	20	560
Land Rover ...	14	Nil	Nil	14	250
Car ...	14	1	Nil	15	283
Tractor ...	35	Nil	Nil	35	179
Motocycle ...	8	Nil	Nil	8	14
Lawn Mower ...	63	27	Nil	90	377
Trailer ...	47	1	Nil	48	69
Sprayer (Motorised) ...	76	2	Nil	78	} 53
Sprayer (Manual) ...	132	2	Nil	134	
Workshop Tools & Equipment	47	1	Nil	48	26
Pump ...	19	2	Nil	21	10
Broomwade compressor	3	1	Nil	4	16
Concrete mixer ...	4	Nil	Nil	4	—
Dumper ...	1	1	Nil	2	3
Implement ...	39	2	Nil	41	29
Fram Equipment ...	22	3	Nil	25	39

The following items were manufactured :

- 58 gates & 116 hinges
- 64 roof trusses for feedlots at Richelieu and Palmar
- 5160 feet purlins
- 10 Tarpaulins
- 3 Folding doors for Implement Shed at Belle Vue
- 2 Sliding doors for Milking Parlour Machine Room
- 44 Sluice Gates for Terre Rouge Land Settlement and Belle Vue
- 2 Seed Dressers
- 9 Burglar proof windows
- 3 Canopy frames for tractors
- 1 Class A Evaporation Pan
- 32 Flanges for irrigation system at La Ferme
- 3 Windows
- 2 Doors
- 457 small items like studs, base plates, metal forks, bolts, small tools and equipment

Besides, the following work was carried out :

- Pipe laying at Richelieu, Reduit and Curepipe
- Milking machines installed at Richelieu, Palmar and Curepipe.
- 15 Miscellaneous electrical installations and repairs for other Divisions
- 200 drums checked and steam cleaned
- 136 miscellaneous repair works on items like weighbridge, roof, Rollers, locks etc.
- 1 Incinerator was completely overhauled and repaired
- 1500 sq ft. of stand erected at Belle Vue for an Open Day.

16.6 *Mechanisation of Land Preparation for Rice planting*

Puddling of paddy field was carried out as follows :—

The field was first tilled with a rotavator under dry conditions.

Then the field was left under flooded conditions for 5 days. Puddling was carried out with a tractor fitted with cage wheels and a rotavator fitted with a levelling board. The quality of the work was very good.

16.7 *Farm Building*

Architectural Plans and Working Drawings were prepared for the following:—

- (i) Office block — Palmar Livestock Breeding Station
- (ii) Office and store — Engineering Division
- (iii) Silkworm Rearing Building
- (iv) Deeplitter House for La Ferme Agricultural Training Farm (Mins. of Cooperatives)
- (v) Nurses' Quarters at Agalega
- (vi) Copra Dryer at Agalega
- (vii) Office and store, Richelieu Livestock Breeding Station
- (viii) Potting shed, Barkly Experiment Station
- (ix) Cold store and Manipulation Room (Architectural Plan only) Barkly Experiment Station
- (x) Effluent Disposal System — Palmar Livestock Breeding Station
- (xi) Storm water Disposal System — Palmar Livestock Breeding Station

16.8 The following buildings were handed over:—

- (i) Two pump houses at Richelieu Experiment Station
- (ii) Bathroom and W.C. at Model Farm, Richelieu Experiment Station
- (iii) Two greenhouses were repaired

Work started on a Poultry Quarantine Building (3000 sq ft) in July 1978.

The Engineering Division carried out technical supervision of construction work at Richelieu and Palmar Livestock Breeding Stations.

16.9 *Missions Oevrseas*

The Principal Agricultural Engineer visited Agalega in July and Reunion Island in November.

The mission in Agalega consisted in the investigation and reporting on the following:—

- (a) Concrete Block manufacture
- (b) Type of building for the labour force
- (c) Improvement to hospital building
- (d) Replacing a roof over a store damaged during a hurricane
- (e) Mechanical Weeding of *Scaevola toccata* (Veloutier or manioc)
- (f) Improvement to the copra dryers

The recommendations are contained in a report dated 10 January 1979.

The Principal Agricultural Engineer and the Chief Agricultural Officer spent a week in Reunion Island in November 1978 under the auspices of the Comité de Collaboration Agricole and visited two overhead irrigation schemes at Bras de la Plaine and St. André, mechanical harvest and loading of sugar cane at l'Usine de Mare, Livestock Stations near Tampon, I.R.F.A. (Institut de Recherche de Fruits et Agrumes) at Bassin Martin and IRAT (Institut de Recherche de l'Agronomie Tropicale) at Bretagne.

16.10 *Other activities*

The Principal Agricultural Engineer was appointed Chairman of a Technical Committee to study and make recommendations on:—

- (a) problems arising from the use of mechanical loaders at sugar factories;
- (b) measures to be taken to avoid such problems with the implementation of mechanical loading on a more extensive scale; and
- (c) a mechanical loading system which is more suitable to the sugar industry

The Committee held its 1st meeting on the 10th October, 1978 and is expected to submit its report in January, 1979.

The Principal Agricultural Engineer represented the Ministry of Agriculture on the National Road Safety Committee. This Committee advises Government on measures to be taken to improve road safety in the island.

The Senior staff of the Division acted as Chairman on several occasions on Departmental Boards of survey for disposal of vehicles and equipment of other Ministries.

XVII. Field Services Division

HEAD OF DIVISION: M. SOOLTANGOS, AGRICULTURAL SUPERINTENDENT

17.1 The Field Services Division comprised the following sections:

1. Transport Section
2. Livestock Feed Factory
3. Livestock Feed Promotion Scheme
4. La Brasserie Fodder Station
5. Nouvelle Découverte Station
6. Reduit grounds, buildings and workshops
7. Labour Coordination
8. Reduit Canal (Syndic).

17.2 *Transport Services*

The running fleet of vehicles (composed of 95 units) comprising cars, vans, lorries, jeeps and tractors, supplied transport to the various divisions of the Ministry.

17.2.1 The jeeps, land rovers and cars were used for the conveyance of officers, specialists, advisers, field staff, organised group tours and the payment of wages and salaries to personnel employed on outstations.

17.2.2 The lorries and tractors were concerned with transport and field operations.

17.3 *The Livestock Feed Factory*

17.3.1 The production of feedstuff for several types of livestock has been the main activity of the Livestock Feed Factory. The feed produced was partly utilised by the government breeding stations and partly sold to the public. Three new types of feed were produced, namely mineral mixture, dairy supplement mixture and goat feed. The first two were supplied mainly to the Government Livestock Breeding Stations, whereas the third one was prepared on an experimental basis for goat breeders.

17.3.2 The total quantity of feeds produced was 3,424 tons, a figure sensibly lower than that of the previous year; the reduced production could be attributed to difficulties in obtaining ingredients at a certain period during the year. The total sale value of the feeds produced was Rs 4,212,883.69. The sale price of feeds was worked out on the basis of cost of production plus 3% for feeds not facing competition on the local market, and for other feeds, facing competition, minus 17%, so as to maintain the prices reasonably below those of imported feeds.

17.3.3 The various types of feeds produced, their sale price and sale value were as follows:

<i>Type of Feed</i>		<i>Total Production</i>	<i>Rate per Ton</i>		<i>Total Value Sale</i>	
			<i>Rs</i>	<i>cs</i>	<i>Rs</i>	<i>cs</i>
Chick feed	...	71 tons 300 Kg.	1,855.00		134,500.23	
Poultry feed		284 „ 375 „	1,731.00		467,353.59	
Creep feed	...	9 „ 605 „	1,847.00		18,756.26	
Pig grower	...	160 „ 800 „	1,484.00		239,617.52	
Pip starter	...	67 „ 150 „	2,235.00		150,080.25	
Cow feed	...	2,516 „ 810 „	1,062.00		2,683,312.92	
Bull feed	...	28 „ 150 „	1,603.00		45,685.50	
Calf feed	...	42 „ 800 „	1,970.00		86,286.00	
Rabbit feed	...	13 „ 090 „	1,723.00		21,994.06	
Horse feed	...	45 „ 400 „	1,724.00		79,735.00	
Special horse feed	...	146 „ 960 „	1,867.00		273,793.24	
Mineral mixture	...	2 „ 740 „	2,090.00		5,213.70	
Dairy supplement mixture...		3 „ 180 „	1,608.75		5,115.82	
Goat feed	...	2 „ 110 „	1,290.25		2,722.40	
		3,424 tons 470 Kg.			4,214,166.49	

17.4 *Livestock Feed Promotion Scheme*

Sale of cowfeeds under the cowfeed subsidy scheme was effected at 27 sale centres spread across the country. About 7,190 breeders registered themselves for the scheme and a total of 757,620 kgs of cowfeed were sold at the subsidised price of 55 cents/kg.

17.4.1 As far as bagasse/molasses feed produced by St. Antoine Sugar Estate was concerned 757,620 kgs of that mixture were sold to breeders at 42.5 cents per kg. Since the end of October, that Sugar Estate has discontinued the production of the mixture due to shortage of certain raw materials, namely bagasse pith.

17.4.2 Other feeds were sold at the feed centres at non-subsidised rate namely:

	Kgs
Poultry feed ...	36,920
Chick feed ...	6,575
Pig grower feed ...	4,550
Pig starter feed ...	350

17.5 *La Brasserie Fodder Station*

This station provided fodder mainly to the Curepipe Livestock Breeding Station and the Division of Veterinary Services, Reduit. The Prisons Department also collected fodder at times of scarcity.

17.5.1 The total fodder supplied amounted to 2,225 tons 975 kgs, distributed as follows:

	Tons	Kgs
Curepipe Livestock Breeding Station ...	2,065	975
Division of Veterinary Services, Reduit ...	82	
Prisons Department, Richelieu ...	78	

17.6 *Nouvelle Decouverte Station*

17.6.1 Activities on this station centered on the care and maintenance of an area of about 10 arpents under mulberry plantation, an area of about 12 arpents under fodder and the production of some vegetables.

17.6.2 The total amount of fodder produced was 308 tons 675 kgs, distributed as follows:

	Tons	Kgs
Division of Veterinary Services, Reduit ...	257	200
Entomology Division ...	8	975
Curepipe Livestock Breeding Centre ...	42	500

5,102 kgs of mulberry leaves were supplied to Entomology Division and 16,800 mulberry cuttings were supplied to the following:

	Units
Entomology Division ...	11,500
Development Works Corporation ...	4,500
Forestry Service ...	800

The various vegetables produced were sold to the field staff and the sales amounted to Rs 4,570.70.

17.7 *Reduit Grounds, Buildings and Workshops*

The grounds around the Head Office, Division of Veterinary Services and Poultry Section were cared for and maintained throughout the year.

17.7.1 The blacksmith and carpentry workshops provided services to all divisions of the Ministry on various jobs as maintenance and repairs to buildings, repairs and supplies of office furniture, repairs to pipes, agricultural equipment, running and maintenance of irrigation equipment. A motor vehicle workshop came into operation during the year and provided a maintenance service and minor repairs to the various vehicles of the Ministry based at Reduit. The binding Section has offered binding services to the various Divisions and the Ministry's Library.

17.8 *Labour Co-ordination*

Seasonal labour was provided to the various Divisions of the Ministry.

17.9 *Reduit Canal (Syndic)*

The management of the canal remained the responsibility of this Division. Repairs and general maintenance remained the routine activities to ensure regular and adequate supply of water to Le Reduit, the Central Experiment Station and to the other users of the canal.

XVIII. *Extension Service Division*

HEAD OF DIVISION: G. NAIDOO, ACTING DIVISIONAL SCIENTIFIC OFFICER

18.1 *Staff position:*

At 31st December 1978, the staff position of the Division was as follows:—

- 1 Acting Divisional Scientific Officer
- 1 Scientific Officer (Agronomy Extension)
- 1 Agricultural Superintendent
- 6 Senior Technical Officers
- 30 Technical Officers (including 2 attached to Young Farmers)
- 1 Senior Field Assistant
- 8 Field Assistants
- 30 Agricultural Trainees
- 1 Clerical Officer
- 4 Technical Assistants
- 5 Clerical Assistants
- 1 Agricultural Assistant
- 2 Typists
- 1 Publicity Assistant
- 2 Office Attendants
- 3 PPE Labourers performing duties of Office Attendant

In addition, 1 Agricultural Extension Adviser, 1 Senior Statistical Assistant and 1 Statistical Clerk were attached to the Division.

18.2 *Movement of Staff:*

- (a) The following 12 newly appointed Technical Officers joined the Division in January 1978, S. Ramdin, C. S. Prayag, R. N. Pillay, G. Rajaram, G. Rajputty, V. Caulloo, N. Hurpaul, K. K. Heeraman, V. Bachraz, V. Cathaperaml, C. Tse Sik Sun, M. Rughoo, out of which Technical Officer G. Rajputty left the Ministry in the same month. Technical Officer S. Ramdin was assigned the responsibility of Tea Extension work.
- (b) Technical Officers P. Kan John and Ramsurrun were transferred to the Arbitration and Control Board in January.
- (c) Technical Officers K. Soniah and M. Teeluck were posted in
- (d) Clerical Officer B. Bhugun left the Division in March 1978 and was replaced by Clerical Officer J. G. Ramiah in the same month. The latter was transferred to Engineering Division in September, and was replaced by Mrs. L. Chong Shing Sen.
- (e) Field Assistant Beekarry and Trainee Heerasingh were transferred to the Land Use Division in March.
- (f) Technical Officers B. Rajkoomar and Y. Bachraz were attached to the Young Farmers movement in April for a period of one year.
- (g) Mrs. J. Perichon joined the Division as Typist in May.
- (h) Senior Technical Officer A. Gumani joined the Division in May, and was made responsible for Grand Port/Savanne region.
- (i) Field Assistants Lee Baw and Santchurn resumed duty at the Division in September after the completion of their Diploma Course at the University of Mauritius, whereas Field Assistant Poinen resumed in October.
- (j) Technical Officer Rughoo who had been awarded a scholarship by the University of Mauritius left the Division for higher studies in September.
- (k) Technical Officer T. Li Yuen Fong and A. Y. Moraby went on leave without pay for a three year period in November to take up appointment in the Ivory Coast.
- (l) Technical Officer S. Chung Ting Wan was posted to the Division in November.
- (m) Technical Officer C. S. Prayag was put in charge of the Agricultural Youth Unit as from July 1978.
- (n) Technical Officer V. Bachraz was posted to the Information Section in July 1978.

18.3 *Boards and Committees :*

The Acting Divisional Scientific Officer sat on the following Boards and Committees during the year :—

- (a) Sugar Planters Mechanical Pool Corporation Board
- (b) Pesticide Control Board
- (c) Land Settlement Committee
- (d) Irrigation Committee
- (e) Onion and garlic Committee
- (f) Potato Committee
- (g) Man and Biosphere Committee
- (h) Plant Importation and Quarantine Committee
- (i) Rural Development Committee
- (j) Vegetable Production Committee
- (k) National Federation of Young Farmers Club Committee

In addition the Acting Divisional Scientific Officer sat on the following *ad hoc* Committees :—

1. Departmental Board to look into certain problems at the Division of Veterinary Services.
2. Agro-Economic Survey Committee.
3. TV/Radio Impact Survey Committee.
4. Belle Vue Open Day organising Committee.
5. Organisation and Technology of Small Planters Committee (ENDA Sub-Committee).

18.4 *Field Visits :—*

(a) *Crops :*

17,661 field visits were paid to small sugarcane and foodcrop planters. 1,618 new planters were met and advised.

(b) *Livestock :*

Some 2000 visits were paid to cowkeepers who have obtained a New Zealand cow under the Cattle Distribution Scheme, and 946 visits were paid to cowkeepers having the local breed.

In addition, 658 visits to goat keepers, 587 visits to rabbit keepers, 10 visits to pig keepers and 20 visits to poultry keepers were also paid.

During these visits, advice was given mainly on methods of cultivation of crops, insect pests and disease control, housing, management and feeding of livestock.

As from 1st April, the crop and livestock Extension work were merged so that henceforth every officer will advise on both crop and livestock aspects in his Zone.

18.5 *Group meetings:—*

197 evening meetings were held on various topics in various localities of the island dealing with crops and livestock. These were attended by 2,857 farmers.

18.6 *Demonstrations:*

43 demonstrations were carried out in planters' fields during the year, and included:—

- (a) Use of fertilisers in sugarcane, onion, groundnut, potato and fruit trees;
- (b) Use of Copper oxychloride against sooty mould in fruit trees;
- (c) Use of Folimat and Folithion against aphids and mealy bugs;
- (d) Use of Copper oxychloride on canker in citrus plants;
- (e) Soil sterilisation with Vapam in onion cultivation;
- (f) Use of insecticides and weedicides in onion and groundnut plantation;
- (g) Correction of soil pH with slaked lime.

18.7 *Statistics and Surveys:*

- (a) In addition with the TV/Radio impact survey conducted in 1977, 82 among the non-respondents were re-interviewed so as to have an idea of the correctness of the survey.
- (b) Data on monthly foodcrop production, and on prices of vegetables and fruits at the market and at Sugar Estate sale points were collected.
- (c) A survey on localities where mechanical cane loaders could operate was conducted.
- (d) A survey on localities where soil erosion occurred was carried out.
- (e) Numerical data on main fruit trees grown and livestock kept in the island were collected by the Senior Technical Assistants from the Control Board who were attached to the Extension Division during the intercrop season.
- (f) In December, Technical Officers started collecting data on the number of fruit bearing litchi and longane trees. They were expected to complete the survey at the beginning of 1979.

18.8 *Agricultural Youth Movement:*

The number of clubs in existence at 31st December 1978 was 62. Kitchen gardening and rabbit keeping projects of Agricultural Youth Clubs members were assessed, and prizes were distributed among the participants.

Materials for the construction of rabbit hutches were distributed to all clubs, and guidance was given to the members for building the hutches.

Talks were delivered by Technical Officers and Senior Technical Officers on rabbit keeping and kitchen gardening at the seat of various Agricultural Youth Clubs; in addition, a training course to impart some knowledge of agriculture to members was organised during the second quarter at the four Demonstration Centres and at Reduit, and lectures were delivered by Technical Officers of the Division.

A training course for Committee members was organised at Pointe Jerome Youth Training Centre.

An essay competition was also held among the members in the last quarter of 1978.

The float for Independence Day Celebrations at the Champ de Mars was prepared by the Extension Division, and depicted the Agricultural Youth Movement in Mauritius.

18.9 *Information Section:—*

41 TV talks on various agricultural topics were delivered by various Officers of the Division in the course of the weekly agricultural programme, and along the same line 42 Radio talks were delivered by the Senior Technical Officer (Information Section).

23,248 copies of Farming News were distributed among members of the Farming Community.

In addition, other leaflets on crop cultivation and livestock rearing were distributed to farmers. The revised edition of the "Petit Guide pour l'élevage du lapin" was printed and copies distributed among rabbit keepers.

18.10 *Audio Visual Section:—*

(a) The agricultural zoning was modified this year, with the island being divided into 25 zones based on factory areas. Previously the island was divided into 18 agricultural zones only. One Technical Officer was put in charge of every zone.

The zoning was as follows:—

- 8 zones in Port Louis/Pamplemousses/Riv. du Rempart
- 7 zones in Moka/Flacq
- 4 zones in Black River/Plaines Wilhems
- 6 zones in Grand Port/ Savanne

The Audio Visual Unit prepared 2 maps of 1 : 25000 scale to depict the new agricultural zoning and further prepared 8 smaller maps to depict the same, and these were handed over to Officers.

(b) The Audio Visual Unit was responsible for the printing of Farming News, and other leaflets for distribution among farmers.

(c) The Unit provided the necessary materials to help officers going for TV talks and evening meetings.

(d) The Unit continued to help research divisions by taking photographic records of experiments.

18.11 *Demonstration Centres and sub offices:—*

- (a) At 31st December 1978, there were 16 Extension offices throughout the island. Besides the Demonstration Centres at Mapou, Flacq, Plaisance and Rivière des Anguilles, and sub-offices at Arsenal, Bel Air, St Pierre, Bassin, Bambous, Vacoas and Rose Belle, new sub-offices were opened at Triolet, Rivière du Rempart, Montagne Longue, Vallée des Prêtres and Wooton, where planters and breeders could call for advice and information and also for getting permits to purchase seeds of groundnut, beans, peas, coriander, pomme d'amour, cucumber, watermelon, radish, squash and lettuce at Barkly Experiment Station.
- (b) Newly released cane varieties M 376/64 and M 1227/62 were planted on all Demonstration Centres.
- (c) Results of the comparative trial between "Up to Date" imported and locally produced potato seeds showed no difference in yield.
- (d) Tomato varieties V/c Nova, V/c Venus, V/c Florida and V/c Saturn were grown on all the Demonstration Centres. The variety V/c Venus showed the best performance.
- (e) A 1 lb sample of 'Pusa Red' Onion Variety was obtained from India Via the Agricultural Extension Adviser, and 16 gm of it was sown on various Demonstration Centres for observation, and the rest handed over to the Agronomy Division for trial.
The variety was found to be very susceptible to soft rot. Results from the Agronomy Division are awaited.
- (f) Sale hours on Demonstration Centres were fixed between 12 — 2 p.m. on every day of the week as from August of this year; previously sale hours were from 1 - 3 p.m. on Mondays, Wednesdays and Fridays only.

The value of sales from Demonstration Centres during the year was as follows :

	Rs
Flacq Demonstration Centre	... 19,990.76
Mapou Demonstration Centre	... 11,527.73
Plaisance Demonstration Centre	... 12,077.60
Riv. des Anguilles Demonstration Centre	... 7,281.07

The sales consisted of animal feeds, vegetables produced on the Demonstration Centres as well as goats sold to the public for breeding purposes.

18.12 *Pests and diseases in the field*:—

The following were the most common cases of pests and diseases met in the field by Extension Officers during the year:—

1. Rust in groundnut and beans
2. Stemphylium leaf spot in tomato
3. Powdery Mildew in ladies finger, sponge gourd (pipengaille) and other creepers, chillies, brinjal, green peas
4. Bacterial wilt in tomato, potato, brinjal
5. Leaf eating caterpillars in crucifers
6. Red spider mites in tomato, brinjal, ladies finger, 'angive'
7. Fruit flies in tomato, creepers
8. Mealy bugs in pine apple, coconut (and on filao trees at Palmar, Belle Mare and Trou d'Eau Douce)
9. Red ants in pine apple
10. Downy mildew in sponge gourd, and other creepers, ladies finger
11. Cutworm attack in ginger, chilly, beans, crucifers, potato, ladies finger
12. Heliothis in tomato
13. Gall midge in mango tree
14. Soft rot in ginger, crucifers, onion, potato
15. Rhinoceros beetle in coconut
16. Aphids in cucumber, voehm (cowpeas), ladies finger, chillies, water melon, citrus and petsai
17. Agromyza in bean
18. Leaf roll in potato
19. Pink borer in maize
20. Leaf chlorosis in ginger, pine apple
21. Cercospora leaf spot in groundnut
22. Purple blotch and white tip of leaves in onion and garlic
23. Leaf tiers on bean and groundnut
24. Root knot nematode in onion
25. Thrips in onion and garlic
26. Blast in onion and garlic
27. Blight in potato, ginger, carrot, tomato
28. White rust in crucifers
29. Cratopus sp. in citrus plant
30. Pink root rot in onion
31. Free living algae on tea stems
32. Anthracnose on mango, bean
33. Broad mites on chillies
34. Lime induced chlorosis in sugarcane, onion and chillies
35. Spotted borer in young sugarcane
36. Army worm in cauliflower and cabbage
37. Banana leaf roller
38. Mosaic in cucumber and chilly
39. Sooty mould on citrus plants

Very severe in South African garlic imported for consumption and released as seeds by the Marketing Board

40. *Phomopsis vexans* in angive
41. Locusts in sugarcane at Cote d'Or
42. Pod borer in bean
43. Potato scab
44. Canker in citrus plants
45. Tuber moth in potato
46. Mildew in roses
47. Mole crickets on cabbage and cauliflower seedlings
48. Damping off in onion seedlings
49. Scale insects (*Aulacaspis tegalensis*) in sugarcane
50. Yellow spot in sugarcane varieties S 17, M 13/56, M 377/56
51. Angular leaf spots in beans
52. Ear canker in rabbits
53. Newcastle disease in poultry
54. *Stomoxys* in cowbyres
55. Ticks in goats
56. Difficulty of heat detection and conception in New Zealand cows.

In all these cases, appropriate advice was given regarding treatment and control, after consultation wherever necessary with the concerned research divisions.

18.13 *Problems, observations and complaints of farmers:—*

During their field visits, officers came across certain other problems of farmers, which were either settled at divisional level or passed on to higher authorities for necessary action. These problems are listed as follows:—

- (i) Non-availability of seeds at the required time from Barkly Experiment Station e.g. groundnut, bean. Planters have to purchase bean seeds at high cost from other sources.
- (ii) Watercress planters at Carreau Esnouf complaining from time to time of the drying up of the watercress beds as a result of the installation of three powerful water pumps by Mon Désert Mon Trésor Sugar Estate.
Regular visits were paid by Extension Officers to the area to watch the situation closely, and at 31st December 1978, there was some water in the watercress beds; the situation was likely to improve with the oncoming heavy rains. The difficulties faced by the planters have been brought to the notice of the Mon Désert Mon Trésor Sugar Estate.
- (iii) Planters complaining of difficulty in getting labour to work in their fields.
- (iv) Damage to foodcrops of small planters caused by spray of herbicides on sugarcane fields.
Extension Officers visited the affected fields and assessed the damage. Samples were submitted to Plant Pathology Division for confirmation of observations, which were then communicated to the planters for action at their end.
- (v) Planters complaining of high cost of pesticides.

- (vi) Complaint of vegetable planters at Beau Champ that sand quarry work was causing flooding of their plantation by sea water. The Land Surveyor of the Ministry of Housing and Lands, and the Sugar Planters Mechanical Pool Corporation was contacted, and the situation was remedied.
- (vii) Planters at Mare Choisy complaining about the slowness of the Ministry of Agriculture to erect dykes at Mare Choisy to prevent flooding of their plantation.
This matter is resting with Engineers of the Ministry.
- (viii) Breeders complaining of scarcity of fodder, caused by burning of cane tops by Sugar Estates.
Burning of sugarcane works against biological control of pests, and against the small cowkeeper; it is expected to become more widespread with mechanical cane loading, and can only be controlled by proper and timely legislation. Use of silage and elephant grass represent the best alternatives at present for the small cowkeepers.
- (ix) Planters complained of the removal of Government subsidy on fertilisers. The subsidy was subsequently re-introduced.
- (x) Planters observed that the local "Up-to-Date" potato seeds had a better start than the imported "Up-to-Date" potato seeds, and was more resistant to bacterial wilt.
- (xi) Complaint of adulteration of fertiliser and insecticide. Samples were submitted to the Chemistry Division for analysis; one case of fertiliser adulteration and one case of insecticide adulteration were confirmed; planters were informed of the laboratory analysis so that they could take necessary action at their end.
- (xii) Breeders who have already completed their cowshed improvement complain about delay in providing them with a cow.
The matter has been brought to the notice of the Rural Development Committee. However, delay is unavoidable as it takes some time to get pregnant cows for distribution.
- (xiii) Certain breeders complaining that calves of New Zealand Cattle were not collected at 3 months of age, but later.
The matter has been brought to the attention of the Rural Development Committee and every effort was being made to collect calves not later than 3 months after birth.
- (xiv) Breeders complaining of delay in providing them materials for improving their cowsheds.
The matter has been brought to the attention of the Rural Development Committee; it must be pointed out that the materials are supplied by the Development Works Corporation.
- (xv) Breeders complaining of irregular supply of cowfeed at certain feed sale centres.
The matter was brought to the notice of the Field Services Division for necessary action.

- (xvi) Difficulty of rabbit keepers to market their rabbits. At present there does not exist any organisation to process rabbits for market, hence the constraint on an expansion in rabbit meat production.

- (xvii) Planters at La Chaumière complaining of flooding of their fields after heavy rain.

The planters made their complaint in August. The Development Works Corporation was approached for help in deepening the storm drain at the foot of Corp de Garde mountain, but requested that prior permission be obtained from Médine Sugar Estate. This permission was sought for and was obtained in October. The Development Works Corporation was immediately informed that work could now start, but at 31st December 1978, the work had not yet started in spite of several reminders.

- (xviii) Some planters complaining that they were given seed permits by Extension Officers, but when they called at Barkly Experiment Station, they were informed that the seeds were not available. The matter has been discussed with Agricultural Superintendent (Crop Stations) and it has been decided to issue permits on vouchers, and it was expected that this system would help solve the problem.

- (xix) Foodcrop planters at Bel Ombre have complained about damage to their crops by Polaris applied by helicopter on a nearby sugarcane field.

An assessment of damage has been worked out jointly by the Extension Division and Mauritius Sugar Industry Research Institute and this has been submitted to the Director of Air Mauritius for necessary compensation to planters.

At 31st December 1978, the planters claimed they had still not been compensated.

- (xx) Planters complaining of absence of labels on fertiliser bags sold by Mauritius Chemical Fertilizer Industry.

The matter was taken up with the General Manager of Mauritius Chemical Fertilizer Industry, and it was agreed that fertiliser bags should bear conspicuous and proper labels.

A clause to that effect has been included in the Fertiliser Bill which was passed by the Legislative Assembly, during the year. In addition, the Senior Technical Officer (Information) interviewed the General Manager of Mauritius Chemical Fertilizer Industry in one of weekly TV/Radio programme whereby all the complaints of planters regarding fertilisers from Mauritius Chemical Fertilizer Industry were discussed at length.

18.14 *Sericulture and apiculture*

One TV talk and one Radio talk were devoted to sericulture. In addition, some 60 leaflets on sericulture were distributed among interested people. Silkworm rearing was discontinued on the four Demonstration Centres in line with the economy exercise, but the mulberry plantations were maintained.

Similarly for apiculture, one TV talk and one Radio talk were held during the year. Contract was established with the Mauribee Co-operative Society, and eventual beekeepers were to be encouraged to join the Co-operative so as to be able to avail themselves of necessary equipment and advice from experienced beekeepers.

18.15 *Work with Young Farmers*

The two Technical Officers attached to the Young Farmers movement effected field visits to Young Farmers' plantations and gave technical talks and other guidance to the members.

18.16 *Cyclone "Fleur"*

Cyclone "Fleur" visited the island in January, and caused slight damage to leaves of young sugarcane.

The damage was severe in tomatoes, beans, calbash, cucumber and maize; slight to moderate damage was caused to other foodcrops.

18.17 *Open Day at Belle Vue Station*

The Division contributed to the Open Day at Belle Vue on 2nd December, with the preparation and distribution of pamphlets on rice, citrus and vegetable growing, the realisation of pamphlets on rice, citrus and vegetable growing, the realisation and projection of a short film sequence on Belle Vue, and other arrangements to receive visitors during the Open Day.

18.18 *Travelling by motor car*

Due to the limited funds available on the item Travelling, Officers could not travel more than 230 miles per month. This handicap efficient work.

18.19 *In-Service Training*

- (a) The Agricultural Extension Adviser delivered 4 talks on Extension to Officers down to Technical Officer grade during the year and these talks were followed by group discussions.
- (b) Lectures were delivered to the Agricultural Trainees by Officers of the Chemistry and Poultry Divisions in the course of their in-service training programme.

18.20 *Staff meeting*

Weekly meetings were held at Reduit office with the Senior Technical Officers and the staff at Reduit to review the work of the week past and plan for the week ahead.

Along the same line, weekly regional staff meeting were held between the Senior Technical Officers and their Technical Officers at the regional offices.

This arrangement was maintaining good coordination among all officers.

FOODCROPS

The following tables were prepared from data collected by the Division.

Crop	Area Harvested (Arp.)		Estimated Average Yield (Kg/Arpent)		Estimated Total Commercial Production (Metric Tons)	
	1977	1978	1977	1978	1977	1978
Maize ...	1261	1184	1053	966	1328	1144
Manioc ...	30	34	7533	77235	226	246
Arouille ...	48	45	4354	4756	200	214
Sweet Potatoe ...	28	32	4679	5125	131	164
Groundnut ...	728	898	1503*	1590*	1094*	1428*
Irish Potato ...	1702	1744	6407	6968	10905	12153
Beans & Peas ...	583	572	1503	1593	876	911
Pine apple ...	137	120	4431	4517	607	542
Brinjal ...	141	150	5567	5853	785	878
Tomatoes ...	1746	1751	3968	4143	6928	7254
Ginger ...	81	101	6358	6020	515	608
Creepers ...	917	1137	6265	5601	5745	6368
Mixed vegetables ...	1094	1187	6108	5886	6682	6987
Banana ...	754	780	10060	9172	7586	7154
Rice ...	109	86	2523	2291	275	197
TOTAL ...	9359	9821	—	—	43892	46248

The acreages shown above were effective acreages harvested and include the acreages of different crops grown on the same land in one year as well as foodcrops interplanted with sugarcane.

XIX. Projects Implementation Division

HEAD OF DIVISION: K. RAMDAURSING — DIVISIONAL SCIENTIFIC OFFICER

NORTHERN PLAINS IRRIGATION PROJECT

19.1 The Northern Plains Irrigation Project is divided into 3 stages, of which the Stage I only is being implemented. The Stage I covers an area of 1,800 hectares and is divided into six contracts for the purpose of carrying out the physical works. These contracts have been labelled NP1 to NP6.

19.1.1 NP1

The physical works under this contract consist of lining of approximately 10,000 ms of canal, the replacement of old structures and the construction of new intake structures. All works have been completed.

19.1.2 NP2

This contract is subdivided into contracts NP2 A and NP2 B.

NP2 A—construction of diversion weir at River Chevrettes. The Central Water Authority undertook to carry out the redesign of this diversion structure. The Authority concurrently investigated and found Sans Souci weir and canal as an alternative proposal for providing a diversion of flows from the River. The Authority's direct labour force is continuing work to modify the existing Sans Souci Canal and weir.

*Green Weight

NP2 B—construction of Diversion weir at River Vacoas. The work under this contract is substantially complete except for some minor work to be executed.

19.1.3 NP3

This contract concerns the construction of a new concrete aqueduct to take increased flow and the construction of new fall structures to avoid blockage. The physical works are substantially complete.

19.1.4 NP4

This contract is subdivided into NP4 A, NP 4 B, NP4 C and NP4 D. NP4 A which comprises the lining of about 2,740 metres of canal has been postponed pending upon water losses survey which would be carried out by the Central Water Authority. NP4 B and NP4 C deal mainly with repairs and lining of the canal to reduce water losses while NP4 D is the application of membrane lining to repairs executed under NP4 B and NP4 C. About 66% of the work on these contracts had been completed.

19.1.5 NP5 and NP6 A (Section financed by ODM)

Contracts NP 5 and NP6 A include connection of the M1 pipeline to La Nicolière and construction of the main line distribution system from the M1 pipeline respectively. They were out to tender and tenders are due back on the 15th February 1979.

19.1.6 NP6 B (Section financed by CDC)

NP6 B deals with the construction of lateral distribution system between the mains and the hydrants. This contract was out to tender.

NORTHERN PLAINS IRRIGATION PILOT PROJECT

19.2 During this year 243A of land belonging to 82 planters were irrigated.

19.2.1 The acreage of land used for growing vegetables has increased to (44A70) as compared to 28A75 in 1977 as shown in table 19.1.

TABLE 19.1

AREA UNDER VEGETABLES			
	<i>Crop</i>	<i>Pure Stand</i>	<i>Interline</i>
Tomato	...	16A41	
Beans ...	...		10A67
Chillies, Brinjal	...	2A25	
Lady Fingers	...	2A50	
Tobacco	...	6A33	
Maize ...	...		13A80
Bittergourd, watermelon	...		4A00
Groundnuts	...	1A25	
Mixed crops*	...	3A00	

*calabash, pipengailles, voehm

19.2.2 Besides some 10A of virgin cane were planted with the following varieties:

M 555/20 and m 376/64	...	1A00
M 377/56	...	8A97
M 13/56	...	0A40

IRRIGATION SEQUENCE AND RAINFALL

19.2.3 The number of cycles done was eight times. The total rainfall for the year was 1,131.7 mm, which is slightly below average (1,200 mm).

Rainfall recorded for period January 1978 to December 1978.

<i>Month</i>	<i>Rainfall (in mm)</i>	<i>Rainfall above 25 mm occasion</i>
January	94.9	1
February	57.3	—
March	106.5	1
April	300.0	4
May	44.7	—
June	63.7	1
July	165.7	3
August	66.1	1
September	35.5	1
October	76.8	1
November	68.7	1
December	51.9	—
TOTAL	1,131.7	14

CANE YIELD

19.2.4 The average of cane per arpent at the project recorded was 41.9 tons as compared to 26 tons for non-irrigated cane fields.

CANE ELONGATION

19.2.5 Heights of cane in irrigated and non-irrigated fields were taken from mid December 1977 to the beginning of August 1978. The average height of irrigated and non-irrigated cane was 65.3 cm and 40 cm respectively at the beginning and 272.4 cm and 246.1 cm at the end.

19.2.6 The Water Users' Co-operative Society was still responsible for the running of the project and it had two general meetings and four executive meetings.

TECHNICAL DIFFICULTIES

19.2.7 The society met with many problems concerning the running of irrigation work and these problems were, to a great extent, responsible for the decrease of the number of cycles done this year (8 cycles).

These problems were:

frequent burts of aluminium pipes (27 times)

frequent disconnections of both aluminium and steel pipes (124 times were recorded)

breakdown of Target Master (10 times) and tractor (3 times)

breakdown of starter (6 times)

power cuts (17 times)

Besides, the starter at Borehole No. 2 broke down 8 times and there were 59 power cuts. It is to be noted also that two asbestos pipes, which feed water to the reservoir at the Pilot Project burst.

POLARIS EXPERIMENT

19.2.8 An experiment on polaris was carried out on Messrs Toolsee's plots in June 1978. The results are as follows:

		<i>Control</i>	<i>Treated</i>
Average yield (tons/arp.)* ...	...	46.0	44.1
<i>Sampling done at 41 days</i>			
Average IRSC†...	...	9.17	10.47
Average tons sugar per arp.	...	4.22	4.62
Difference ...	...	+ 400 kg	
<i>Sampling done at 57 days</i>			
Average IRSC†...	...	9.70	11.62
Average tons sugar per arp.	...	4.46	5.12
Difference ...	...	+ 670 kg	

SMALL SCALE IRRIGATION PROJECT

19.3.1 The aim of this project is to provide irrigation water to planters whose lands are not covered by the large irrigation schemes.

All the projects, considered for implementation last year, were financed by the French Government.

IRRIGATION UNIT AT: LA FERME

19.3.2 An irrigation unit has been set up at La Ferme. It covers an area of 30 arpents and belongs to the co-operative society.

All physical works have been completed, and it is expected to be operational early next year.

PLAISANCE

19.3.3 Several meetings with planters were held with a view to grouping them into a water users' co-operative society. The source of water for this project is Rivière La Chaux. Concerning water rights, a request has been submitted to the Supreme Court. The request includes all technical details prepared jointly by the Ministry and the Central Water Authority.

*estimated

†industrial recoverable sugar % cane

COTTAGE

19.3.4 The planters in the region do not seem to be interested in irrigation. This is indicated by the poor response to the meeting held in the locality. Besides, the area earmarked for irrigation has been reduced considerably.

L'ESPERANCE TREBUCHET

19.3.5 At L'Espérance Trebuchet there has been a marked decrease in the acreage of sugarcane under irrigation. This partly because of a fairly rainy season and failure to organise an irrigation schedule without employing a full time pump operator and "irrigueur". However, as regards vegetable cultivation it is observed the number of planters irrigating their land has increased. The area covered extended to 48 arpents and was planted with the following:

Tomato	...	...	10A
Bitterground		...	15A
Chillies	...	...	2A
Mixed vegetables		...	1A
Lady finger		...	1A
French Bean		...	10A
Cucumber		...	9A

During the year, there were several pump breakdowns. Fluctuation in power was noticed to be the major cause of the breakdown.

On account of the labour problems which prevent the smooth running of the project, the implementation of the second phase of the project was postponed. A proposal for a drip irrigation system, which is expected to reduce the cost of labour and electricity, has been worked out. Before embarking on this system, the Ministry proposes to set up a pilot project at La Ferme, with the view to studying the problems therein. This would help to undertake comparative study of the irrigation projects under different system.

WESTERN COASTAL REGION IRRIGATION PROJECT

19.4 The phase I of the Western Coastal Region Irrigation Project consists of La Ferme System and extends over an area of 1,472 hectares. The preparation of tender document and detailed design was undertaken by the firm "Société de Traction et d'Electricité".

XX. Land use and Environment Division

HEAD OF DIVISION: J. R. N. GOVINDEN, OFFICER IN CHARGE UP TO 1.9.1978
M. RAMTOHUL, ACTING DIVISIONAL SCIENTIFIC OFFICER
FROM 11.9.1978 TO 2.11.1978
I. RAJKOMAR, ACTING DIVISIONAL SCIENTIFIC OFFICER
FROM 2.11.1978

20.1 The Land Use Division is responsible for:—

- (a) Land use and Soil Conservation,
- (b) Land Settlements,
- (c) Technical assistance in the execution of Agricultural Projects in the Rural Development Programme of Economic Planning and Development,
- (d) Liaison between Agricultural Services in Rodrigues and the Specialist Divisions of the Agricultural Services at Reduit,
- (e) Matters relating to the environment.

20.2 *Land Use*

20.2.1 The Division's principal objective is to optimise the use of the very limited land resources of Mauritius. Particular emphasis is placed on natural land use and on the safeguard of good agricultural land.

20.2.2 There has been an increase in built-up areas mostly at the expense of agricultural land. Land Use implications of applications for subdivision of agricultural land for non-agricultural purposes were therefore carefully considered.

20.3 *Land Settlements*

C. S. AMIDE, AGRICULTURAL SUPERINTENDENT
T. L. LI YUEN FONG, TECHNICAL OFFICER

20.3.1 There are in all 14 settlements under the control of the Division. They are situated at Petit Sable, Grand Sable, Belle Vue, Richelieu, Terre Rouge, Palmar, The Vale, La Cave, Plaisance, Papavert, Bee Manique, Buffer Zone, Moona and Elysée.

20.3.2 There are 680 tenants in all the settlements and the number of holdings is 754. The area of each holding varies from 0.25 arpent to four arpents. Terre Rouges and Richelieu Settlements are supplied with irrigation water.

20.3.3 The payment of rent by the tenants was satisfactory. Several cases of non-payment of arrears of rent referred to the Crown Law Office for necessary action have not yet been regularized. A new Land Settlement

Lease Agreement has been prepared, but the renewal of leases could not be effected so long the Crown Law Office did not submit an up-to-date return of arrears. As from July 1977 the tenants have been charged the new rentals which are as follows:

- (1) Rs 165 per arpent for land provided with irrigation water or for land in the humid zone, used for the cultivation of sugarcane.
- (2) Rs 120 per arpent for land without irrigation or land in the drier regions, used for the cultivation of sugarcane.

Rs 120 per arpent for land used for the growing of foodcrops.

20.3.4 The case of squatters at Grand Sable and Petit Sable Land Settlements was investigated. It is now possible to regularise the situation. Detail plans from the Survey section is awaited.

20.3.5 There were two meetings of the Land Settlement Committee held in April and August respectively. At the first meeting the question of renewal of leases was the main item considered. It was agreed to renew the leases with all good tenants: those who are more than fifty years old could opt to transfer their holdings to one of their heirs provided the latter was qualified. At the second meeting nine cases of transfer were approved; also representations made by a group of tenants from Terre Rouge Land Settlement were examined.

20.4 *Rural Development Agricultural Projects*

20.4.1 The Rural Development Agricultural Committee under the Chairmanship of the Principal Agricultural Officer (Development) met regularly to follow up the progress of work in the rural development agricultural projects.

20.4.2 Follow-up of the cows distributed under the Rural Development Programme was continued by Officers of the Livestock Extension Service and of the Animal Health Division. The Livestock Extension Officers advised on animal nutrition and management in general and the officers of the Animal Health Division provided artificial insemination facilities and advised on animal health. The programme of cowshed improvement under the Technical Assistance and Supervision of the Livestock Extension Service continued.

20.4.3 The Extension Service also provided technical assistance in the Self-Help Projects, rabbit keeping and kitchen gardening.

20.5 *Research: H. UNMOLE, TECHNICAL OFFICER*

20.5.1 An initial survey was carried out to find the extent and magnitude of soil degradation with emphasis on water erosion in Mauritius.

20.5.2 Erosion-susceptible areas were identified and a map to show their geographical location has been prepared.

20.5.3 At present the trends are evident. There is an increasing pressure on agricultural land, so that it is becoming necessary to bring into production marginal lands which are unsuitable for farming unless soil conservation measures are taken.

20.5.4 Some of the results of soil erosion were:—

- (1) Shallow top soil in the Chamarel intermontane slopes and lower mountain slopes of Crève Coeur and Callebasse.
- (2) A decline in fertility and exposure of subsoil around Quatre Soeurs, Deux Frères and Grand Sable areas.
- (3) Truncated soil profiles on upper convex slopes at Callebasse/ Crève Coeur.
- (4) Active rill erosion, e.g. Crève Coeur, Bel Ombre, etc.
- (5) Sediment pollution of rivers and lagoons, e.g. tributaries of Grand River South-East and lagoons in South-East Coast.
- (6) Occurrence of flash floods, e.g. at Quatre Soeurs, Deux Frèrese, etc.

20.6 *Environment*: T. S. RAMYEAD, TECHNICAL OFFICER

20.6.1 The section of the Division dealing with environmental matters, has the following aims and objectives:

- (a) To draw the attention of the Government, the public and private bodies to the value of the environment, to point out the specific threats to the environment, resulting in air pollution, water pollution and the damage done to land, sea, plant and animal life.
- (b) To prepare environmental legislation and advise on the apparatus for the enforcement of such legislation.
- (c) To educate the public to preserve and improve the environment.
- (d) To continuously conduct monitoring and assessment of the environment and undertake research related to environmental matters.

20.6.2 The Division established the necessary co-ordination of the various Ministries and bodies so as to tackle environmental problems, such as cases of pollution complaints and the granting of permits for land use and industrial buildings.

20.6.3 *Investigation of Pollution Complaints*

Cases of pollution complaints were investigated and the reports and recommendations on these cases were submitted to the Ministry. The following are some cases which have been investigated over the year:

- (a) Siting of gas depot in Port Louis, following petitions and letters of complaint from the surrounding inhabitants, regarding the hazards of explosion.
- (b) Leather tanning factory in Quatre Bornes—a case of odour nuisance badly designed drainage and collection of the effluents from the tannery.
- (c) Marine pollution—pollution of the east coast by tar balls. The Division and the Ministry of Fisheries carried out surveys on various beaches. With the help of the co-ordinating work of the Division, the Ministry of Agriculture and Natural Resources and the Environment convened meetings with officers of other Ministries. Remedial action was taken and the supervision of the cleaning operation on the beaches was shared by the Division and the Ministry of Fisheries.
- (d) Tyre retreading factory in Terre Rouge—objections from some local inhabitants to the setting up of this factory on grounds of air pollution and odour nuisance. With the collaboration of the Ministry of Health, it was assured that the plants of the factory would conform to certain standards so as to minimize pollution.
- (e) Stone crushers—the Division visited several stone-crushing plants, following letters of complaint regarding noise pollution by air borne rock dust.
- (f) Sugar factories—over the year, three sugar factories were visited—Savannah S.E., Highlands S.E. and Société Reufac (Reunion); the investigations were concerned with air pollution due to fly ash and bagasse soot emanating from main chimney stacks, pollution of nearby water ways by the discharge of effluents from the factories and thermal pollution of these water-ways. The Division liaised with the Ministry of Health for further appropriate action.

20.6.4 *World Environment Day*

The Division was given responsibility for organising the programme for the 'World Environment Day' which is launched by the United Nations Environment Programme, and is held on the 5th of June every year. 1978's topics for the World Environment Day were:

- (i) Environmental Disease—Malaria
- (ii) Chemicals and the Environment
- (iii) Increasing the Agricultural base for food production: the use of agricultural and agro-industrial residues
- (iv) Energy conservation.

Officers of various Ministries and the University of Mauritius were invited to prepare short talks and a forum on the above subjects. The programme was broadcast on television and the Minister of Agriculture and Natural Resources and the Environment also delivered a talk on World Environment Day and its topics for 1978.

20.6.5 *Infoterra National Focal Point*

Infoterra, (formerly the International Referral System), is a world-wide referral service network for exchange of environmental information; it enables countries to exchange environmental information among each other sometimes through simple mail correspondence and with very little or no financial aspects involved. Infoterra was set up by the United Nations Environment Programme (UNEP), in Nairobi, Kenya.

Sources of environmental information from various countries are registered with Infoterra at UNEP in Nairobi, which then prints out an Index and a Directory of the sources, and forwards copies of these to the Infoterra National Focal Points of the respective countries. The National Focal Points propagate Infoterra in their countries inviting various bodies and individuals to make use of the system. To date, about 8000 sources from about 100 countries are registered with Infoterra and these numbers are steadily increasing. The Indices and Directories of Infoterra are constantly updated.

The National Focal Point of Infoterra in Mauritius is at the Ministry of Agriculture and Natural Resources and the Environment. The Land Use and Environment Division handles all Infoterra matters and is presently organising the propagation of the system in Mauritius. The staff of the Division is already exchanging environmental information and has so far corresponded with sources in the United States, Australia and the United Kingdom.

Technical Officer T. S. Ramyeed attended Infoterra training courses and workshops in Cairo, Egypt and in Nairobi, Kenya.

20.6.6 *Visit of Mr. Baumer, Ecologist*

The Division was responsible for organising the programme of visit of Mr. Baumer, an ecologist from the Agence de Cooperation Culturelle et Technique (ACCT), who came to Mauritius in May 1978

Mr. Baumer's visit was concerned with the conservation and improvement of the ecological resources of Mauritius, Comores, Reunion and Seychelles.

20.6.7 *Enda Seminar*

A one-week seminar on "L'Environnement des îles surpeuplées de l'ouest de l'Océan Indien" was organised jointly by the Ministry and the Environment Development Action (ENDA).

The objectives of the seminar was concerned with food consumption and production patterns in Reunion, Seychelles, Comores and Mauritius.

XXI. Agricultural Division—Rodrigues

OFFICER-IN-CHARGE: J. F. KWET ON, ACTING AGRICULTURAL SUPERINTENDENT

GENERAL

21.1 Rainfall was a little more abundant and more evenly distributed than during the previous year, but was still well below the normal. There was some improvement in crop yields, in general.

21.1.1 Rainfall

	1977	1978	Normal for 10 yrs
Plaine Corail ...	431.3 mm	631.2 mm	—
Pte. Coton ...	683.0 mm	759.8 mm	1249 mm
Solitude ...	1017.1 mm	1016.3 mm	2009 mm
Lataniers ...	861.1 mm	973.0 mm	1492 mm
La Ferme ...	933.1 mm	1026.4 mm	1543 mm
Oyster Bay ...	871.0 mm	1099.4 mm	1396 mm
Riviere Coco ...	487.6 mm	616.2 mm	1284 mm
Port South East ...	905.3 mm	1078.5 mm	1071 mm
Marechal ...	861.7 mm	1087.9 mm	1326 mm
Anse Ally ...	393.4 mm	530.7 mm	1157 mm

21.1.2 Mr. Reynolds Moothoo, Technical Officer arrived for a tour of service of one year in replacement of Mr. R. K. Soniah who will leave soon.

21.1.3 Messrs. Antoine, Ricaud and Felix of the M.S.I.R.I. visited the island during one week in connection with a survey of virus diseases of maize.

21.1.4 Mr. R. Brunet, the Principal Agricultural Officer responsible for Rodrigues, also paid a routine visit to the island.

LAND DEVELOPMENT

21.2 Land terracing was carried out on the following sites:—

- (1) Citronelle Section ... Citron Donis, Camp de Paul, Mt. Limon;
- (2) St. Gabriel Section ... Mt. Goyave, Terre Rouge;
- (3) La Ferme Section ... Bay Topaze;
- (4) Marechal Section ... Deux Montagnes, Mt. Cabri, Papayes,
Baie Malgaches;
- (5) Trefles Section ... Patates Theophile, Mt. Jatte.

21.2.1 Due to problems encountered with the supply of broken stones, work which was scheduled to be completed by June 1978 at Mt. Goyave and Patate Theophile had to drag on until September 1978. After completion of these two sites the labour force was shifted to two new sites at Terre Rouge and Mt. Jatte.

21.2.2 This project employed a total of 253,759 men/days which can be broken down as follows:—

<i>WFP — Paid Labour</i>		<i>Work accomplished</i>	
110,838 men/days	...	Bench Terraces	... 307,068 ft
		Main Drains	... 61,219 ft
<i>Govt. Paid Labour</i>		<i>Work accomplished</i>	
142,921 men/days	...	Bench Terraces	... 586,667 ft
		Main Drains	... 174,359 ft

21.2.3 The above works cover an approximate area of 550 arpents.

21.2.4 Of the 635 development workers working on the Land Development Project and benefiting from WFP aid during year 1977, there are only 158 left; the remaining 477 having been promoted to the casual status during year 1978.

FARM WATER SUPPLIES

21.3 Except for four projects that were nearly completed at the beginning of the year, work was behind schedule on other sites that were opened during 1978. The sole reason for that delay was the irregular or non-procurement of cement from Mauritius. Works had to stop on two occasions, viz. March to May and September to December, when the labour force was shifted to other work sites such as road repairs, levelling of football grounds, etc.

21.3.1 The following projects started in 1977 were completed in 1978 :

Grand Bay Reservoir	...	30,000 galls;
Solitude Reservoir	...	10,000 galls;
Rivière Banane Reservoir	...	10,000 galls;
Graviers Dam		

21.3.2 At the end of year 1978, the following progress was noted on the other projects :

<i>Projects</i>	<i>Progress as at 31.12.78</i>
Riviere Banane Reservoir No. 1 ... 145,000 gallons	Excavation of foundations completed. Materials dumped on site except for cement.
Accacia Reservoir ... 62,000 gallons	Construction stopped at mid-height on account of lack of cement.
Port South East Dam...	About 75% of works completed. Lack of cement.
Port South East Reservoir 300,000 gallons	Excavation of foundations. 75% completed.
Grand La Rouche Reservoir 62,000 gallons	Excavation of foundations completed. Materials dumped on site except for cement.
Citron Donis Dam ...	Completed and operative.
Mourouque Dam No. 2	Completed and operative.
Mourouque Dam No. 3	Site ready. Lack of cement.
Anse Ally Dam ...	Site ready. Lack of cement.
St. Gabriel Reservoir... 10,000 gallons	About 75% of works completed. Lack of cement.

21.3.3 *Water Pumps*

Two new centrifugal pumps of 400 ft head capacity were received this year and were installed at Pavillon and Mangues in replacement of old existing ones.

21.3.4 The new pumping station at Rivière Banane started operating with a 1200 foot-head National pump, pumping water into the new 62,000 gallon Grenade reservoir. This reservoir supplies water to Roche Bon Dieu Village and to the Sandy flate at Pointe Coton. (Mainly for onion growing).

213.5 The pumping station at Mourouque has been equipped with a third 1200 ft head capacity National pump in order to have more water for distribution to new localities as from Petit Brule reservoir.

213.6 Pipelines

The following new pipelines were laid:

3 — inch 11,800 ft; 01 — inch 15,700 ft;

2 — inch 15,250 ft; $\frac{1}{2}$ — inch 2,340 ft;

213.7 Maintenance works were carried out on 32,000 ft of existing lines.

RE-AFFORESTATION

21.4 Though this capital item is now the responsibility of the Forestry Division, the Agricultural Services continue to help in the implementation of the re-afforestation programme. Forest-tree seedlings produced by the agricultural nurseries have been used to re-afforest the following regions:—

<i>Region</i>	<i>Acreage</i>	<i>Varieties</i>
Grande La Fouche Man- gues ...	12 arpents	Tecoma, Eucalyptus
Chateaux des fleurs ...	12 arpents	Eucalyptus
Baie aux Huitres ...	8 arpents	Miscellaneous
Camp de Paul ...	8 arpents	Arjuna terminalia
Eau Clair ...	...	...
Bassin Martin ...	3 arpents	Badamiers A. terminalia Bois Noir Fongame
Graviers ...	2 arpents	Bois Noir Guango, Aloes
Mt. Bois Noir ...	$\frac{1}{2}$ arpent	Eucalyptus
Palissade Ternel ...	$\frac{3}{4}$ arpent	A. terminalia Vitex

LIVESTOCK AND PASTURE DEVELOPMENT

21.5 Animal Statistics as at Aest December 1978

21.5 Cattle

<i>Station</i>		<i>Adult</i>		<i>Young</i>		<i>Total</i>
		<i>M</i>	<i>F</i>	<i>M</i>	<i>F</i>	
St. Gabriel	...	1	18	10	8	37
Bay Topaz	...	5	8	9	17	39
Marechal	...	2	13	7	17	39
Oyster Bay	...	1	7	5	4	17
						132

21.5.2 There have been 35 calvings producing 21 males and 14 female calves. 27 deaths were recorded during this year, among them 9 heifers and 4 cows died at B. Topaz due to lack of water. 9 bulls were sold to farmers.

21.5.3 *Pigs*

Station		Adult		Young		Total
		M	F	M	F	
Marechal	...	5	9	10	14	38
St. Gabriel	...	4	14	14	17	49
Bay Topaz	...	1	2	9	12	24
						111

21.5.4 There were 29 farrowings producing 138 piglets, 61 males and 77 females, with about 83% survival at weaning age. 93 piglets (43 males + 50 females) were sold to farmers. 3 sterile sows and 2 old boars were also sold to farmers for slaughter.

21.5.5 *Goats*

Station		Adult		Young		Total
		M	F	M	F	
St. Gabriel	...	3	2	1	—	6
Oyster Bay	...	2	—	—	—	2
						8

21.5.6 7 kiddings produced 7 males and 2 females, 5 males and 2 females were sold to farmers. 9 males and 4 females died.

21.5.7 *Sheep*

Station		Adult		Young		Total
		M	F	M	F	
Crab Island	...	40	82	38	27	187

21.5.8 There have been 120 lambings with a percentage survival of 80%. 2 rams and 8 ewes were sent to Palmar Livestock Breeding Station and 6 lambs were sold to farmers.

21.5.9 *Rabbits*

Station		Adult		Young		Unsexed	Total
		M	F	M	F		
Marechal	...	4	15	10	10	7	46

21.5.10 259 kids were born of which 141 died. 102 youngs were sold to farmers at weaning age.

21.5.11 In general, supply of concentrates feeds is more or less stabilised. 75 tons of maize from World Food Program, infested with weevils, were distributed as animal feed.

21.6 Pasture Development

During this year much effort has been devoted to uprooting of *lantana*, planting acacia and fencing by means of stone walls. In addition a siratro stylo trail was done at Marechal and new grass spp planted at St. Gabriel. At the end of this year, the following was accomplished.

21.6.1 10 arpents of grasses (*Paspalum* spp) were planted at St. Gabriel.

21.6.2 70 arpents of veille fille (*Lantara*) were removed at Petite Butte and planted with *Acacia*.

21.6.3 60 arpents *Acacia* were planted on mountain slopes at Bay Malgache.

21.6.4 At the end of 1978, *accacia* were also planted at the following places:—Ste. Famille, Dans Begue, Latanier, Pompee, Eau Vannee, Citron Donis, St. Gabriel, Camp de Paul and Eau Claire.

21.6.5 In addition, 10,734 ft wall have been erected at P. Butte using 13,590 cu. yds stones. At Bay Malgache some 2,930 ft stone walls have been erected to ensure protection against stray animals.

21.6.6 Weeding was carried out on about 120 arpents of established pastures.

LIVESTOCK EXTENSION SERVICE

21.7 During this year, private farmers were given free assistance as regards disease treatment and ectoparasite spraying. As at 31.12.78, the following have been accomplished.

1. Eye infection in calves	...	...	178 cases
2. Third quarter paralysis (pig & sheep)	...	...	15 cases
3. Mineral & Vitamine deficiency	...	...	123 cases
4. Abcesses and injuries in cattle	...	...	48 cases
5. Mastitis in cows	...	...	2 cases
6. Adult boar castration	...	...	5 cases
7. Anaemia in cows	...	...	2 cases
8. Ectoparasite (mitese) spraying (cow, sheep, goats)	...	...	200 cases
9. Worm infestation (cattle, sheep & goats)	...	...	1890 cases
10. 'E. Coli' infestation n poultry	...	...	2125 cases

PRODUCTION AND MARKETING

21.8 The following produce were exported to Mauritius :

	<i>Cattle</i>	<i>Pigs</i>	<i>Sheep/Goats</i>
	10 head	2261 head	5354 head
<i>Poultry</i>	<i>Onions</i>	<i>Salted fish</i>	<i>Dried Octopus</i>
308 crates	130 tons	42 bales of 150 lbs	484 bales of 150 lbs

21.8.1 The approximate values of the exports were :

		Rs
10 head of cattle at Rs 2,200/head	...	22,000
2261 head of pig at Rs 375/head	...	847,875
5354 head of sheep & goat at Rs 225/head	...	1,204,650
130 tons of onion at Rs 3,400/ton	...	442,000
308 crates of poultry at Rs 750/crate	...	321,000
42 bales of salted fish at Rs 900/bale	...	37,800
484 bales of dried octopus at Rs 1050/bale	...	508,200
		3,293,525

21.8.2 The unusually low figure of export for cattle was due to the fact that butchers from Mauritius suddenly stopped buying Rodriguan cattle at the beginning of year 1978. The butchers argued that Rodriguan farmers demanded too high prices for their cattle, whilst the latter argued the opposite.

CROP PRODUCTION

21.9 Though quite below the normal, rainfall was a little more abundant during 1978 than during the previous year. 200 tons of onions of which about 75% were first grade bulbs, were harvested. 2058 arpents of maize plantations produced 1500 tons of cobs. Were also recorded in the private sector 138 arpents of sweet potato and 62 arpents of cassava.

CROP EXTENSION SERVICE

21.10 Planters continued to receive free assistance in our pest and disease control programme. The acreage covered is as follows: Onion—50 arpents; beans—16 arpents; groundnuts—31 arpents; various vegetables—46 arpents.

21.10.1 The 10 demonstration plots of the Agricultural Services produced 11,000 lbs of various vegetables, part of which was sold to the Public and the remainder delivered to hospitals. Were also sold to the Public from our nurseries: 800 coconut seedlings. 670 lime seedlings, 328 pawpaw seedlings, 10 bread fruit cuttings and 70 vine cuttings.

21.10.2 A series of talks were delivered by our Technical Officers to farmers in various regions of the island on the following topics: general aspects of agriculture, soil conservation, crop rotation, fertilizers and their uses, onion planting, fertilizing maize

APPENDIX I

Staff (as at 31st December, 1978)

<i>Appointment</i>	<i>Name</i>	<i>Remarks</i>
Permanent Secretary	... L. Purmessur, B.Sc. Econ. (London)	
Principal Assistant Secretary	R. M. Hurdowar, B.A. (Hons.) (East Africa) D.P.A.M. (Maur.)	
Chief Agricultural Officer	B. D. N. Roy, B.Sc. (Wales) Dip. (Agric.) (Maur.)	
Veterinary Adviser	...	Vacant
Principal Agricultural Officer (3)	K. Lutchmeenaraidoo, B.Sc. Agr. (Reading), Dip. Agr. (Maur.)	
	R. J. S. Moutia, D. Phil. (Gauhati) B.Sc. Hort. (London), Dip. Agr. Econ. (Oxon), Dip. Agr. (Maur.) C.G.L.I. (Sugar Manufacture) 1st Class Cert.	On leave
	T. M. Narain, B.Sc. Agr., M.Sc. Agr. Ext. (Reading) Dip. Agr. (Maur.)	
Temporary Principal Agricultural Officer	L. R. Brunet, B.Sc. Agr. (Reading) Dip. Agr. Ext. (Queensland), Dip. Agr. (Maur.)	

ADMINISTRATIVE AND FINANCE DIVISIONS

Administrative Officer (4)	A. I. Oozeerally, D.P.A.M. (Maur.)
	J. C. Rivet, D.P.A.M. (Maur.)
	V. Mulloo
	Miss A. N. J. Maulloo
Principal Establishment Officer	B. P. Sawmy
Principal Finance Officer	D. Ramyeed

APPENDIX I — *continued*

<i>Appointment</i>	<i>Name</i>	<i>Remarks</i>
Scientific Officer (Agro- nomy)	J. R. N. Govinden, B.Sc. (Hons.) Agr. (Ibadan), M.Sc. (Crop Science) Saskachewan, Canada	On leave
	S. N. Naidu, B.Sc. (Hons.) Agr. (Maur.) M.Sc. (Biometry) (Reading) Dip. Agr. (Maur.)	
	P. P. Vyapoory, B.Sc. (Hons.) Agr. (Maur.), Dip. Agr. (Maur.)	On leave
	H. Rojoa, B.Sc. (Hons.) Agr. (Punjab)	On leave
	C. G. Pallany, B.Sc. (Hons.) Agr. (Maur.)	
	O. Bissoonauth, B.Sc. (Hons.) Agr. (Maur.)	
	L. C. K. Li Kwan Pun, B.Sc. (Hons.) Agr. (Maur.) Dip. Agr. (Maur.)	
	K. Ramdoyal, Dip. Agr. & Sugar Tech. & B.Sc. (Hons) Agr.	On leave
	M. V. D. Domun, B.Sc. (Hons.) Agr. (Maur.)	On leave
	J. M. Heerasing, B.Sc. (Hons.) Agr. (Maur.)	
	M. Y. Boodoo, B.Sc. (Hons.) Agr. (Maur.)	
Scientific Officer (Horti- culture)	M. Ramtohul, B.Sc. (Hons.) Agr. & A. H. (Uttar Pradesh), M.Sc. (Horticulture) Illinois	
	K. F. Lan Chow Wing, B.Sc. (Hons.) Agr. (Maur.) Dip. Agr. (Maur.)	
	S. Seeruttun, B.Sc. (Hons.) Agr. (Maur.) Dip. Agr. (Maur.)	
	V. Veerappa, B.Sc. (Hons.) Agr. (Maur.) Dip. Agr. (Maur.)	
In addition there were:	5 Technical Officers (Agr.)	1 on leave
	1 Clerical Officer	
	1 Office Attendant	

CANE PLANTERS' & MILLERS' ARBITRATION & CONTROL BOARD

General Manager	... A. A. Aumeerally, C.G.L.I. (Sugar Manufacture), B.Sc. Sugar Eng. B.Sc. Chem. Eng. (L.S.U.) Dip. Agr. (Maur.)
-----------------	---

APPENDIX I—*continued*

<i>Appointment</i>	<i>Name</i>	<i>Remarks</i>
Sugar Technologist ...	I. D. Nawoor, B.Sc General, B.Sc. (Hons.) Chem. (Wales)	
Accountant ...		Vacant
Senior Area Superintendent	I. Aumeerally, Dip. Agr. (Maur.) City & Guilds of London Institute (Sugar Manufacture)	
Assistant Sugar Technology	A. A. Tin Loi, B.Sc. (Hons.) Sugar Tech. (Maur., Dip. (Hons.) Agr. (Maur.)	
	K. Deepchand, B.Sc. (Hons.), Sugar Tech. (Maur.)	On leave
	D. Valaydon, B.Sc. Sugar Tech. & Dip. Agr. & Sugar Tech. (Maur.)	
Area Superintendent ...		3 vacancies
Assistant Finance Officer	A. R. Bhowan	
Senior Technical Officer (Sugar)	P. D. Pareima, Dip. Agr. & Sugar Tech. (Maur.) F. Goolamhossen, Dip. Agr. & Sugar Tech. (Maur.) V. Aubeeluck, Dip. Agr. & Sugar Tech. (Maur.) S. M. A. Kurmally, Dip. Agr. & M. A. Bhunnoo, Dip. Agr. & Sugar Tech. (Maur.) M. K. Nujoo, Dip. Agr. & Sugar Tech. (Maur.) M. A. Issany, Dip. Agr. & Sugar Tech. (Maur.)	
In addition there were:	11 Technical Officers (Sugar) 3 Mechanical Officers (Sugar) 24 Senior Technical Assistants 33 Technical Assistants 1 Laboratory Attendant Punch Room Supervisor Punch Verifier Operator 1 Telephone Attendant 1 Executive Officer 1 Confidential Assistant 3 Clerical Officers (2 are giving assistance at Clerical Officer level) 1 Shorthand Writer—Senior Confi- dential Assistant 9 Clerical Assistants 2 Office Attendants	3 vacancies 3 vacancies 9 vacancies 1 vacancy Vacant Vacant Vacant Vacant 3 vacancies

APPENDIX I — *continued*

PLANT PATHOLOGY DIVISION

<i>Appointment</i>	<i>Name</i>	<i>Remarks</i>
Divisional Scientific Officer (Plant Pathology)	G. M. Lallmahomed, B.Sc. (Hons.) Agri. Biol; Ph.D. (Ibadan); Post- Grad. Cert. Plant Pathology (Wageningen); Dip. Agric. (Maur.) M.I.Biol.	
Scientific Officer (Plant Pathology)	J. Bucha, M.Sc. (Auckland), B.Sc. (Auckland) M. Pillay, B.Sc. (Hons.) Bot. (Delhi) Post-Grad. Cert. Plant Protection (Wageningen) M. I. Dossa, BSc. (Hons.) Microbiol. M.Sc. Agr. Microbiol. (Karachi)	
Senior Technical Officer (Scientific)	F. B. Y. Gerval, Dip. Agr. (Maur.) M. A. Peeroo, Dip. Agr. (Maur.) S. S. Wong Ng, Dip. Agr. (Maur.) K. Li Yuen Fong, Dip. Agr. (Maur.) D. Tourabally, Dip. Agr. (Maur.) M. Chinappen, B.Sc. Bot. (Madras) N. B. Y. Yerrigadoo, B.Sc. (Osmania) C. H. Futti, B.Sc. General Biology & Chemistry (Punjab Univ.)	
In addition there were:	5 Technical Officers (Scientific) 1 Extra Technical Officer 9 Laboratory Attendants 1 Senior Clerical Assistant 1 Clerical Assistant	

ENTOMOLOGY DIVISION

Divisional Scientific Officer (Entomology)	M. J. L. Monty, B.Sc. (Hons.) Entomology (Queensland), Dip. Agr. (Maur.)
Scientific Officer (Entomology)	A. Joomaye, B.Sc. (Hons.) Zool. & Bot. (East Africa), M.Sc. (I.A.R.I.) M. Ramsamy, B.Sc. (London) M. Phil. (London) Member of the Institute of Biology Miss S. I. Balluck, B.Sc. Zool. M.Sc. Zool. (Delhi)

APPENDIX I — *continued*

<i>Appointment</i>	<i>Name</i>	<i>Remarks</i>
Senior Technical Officer (Agriculture)	Mrs. M. Li Ting Wai, Dip. Agr. (Maur.)	
In addition there were:	5 Technical Officers (Scientific)	
	1 Extra Technical Officer	
	1 Senior Field Assistant	
	1 Field Assistant	
	3 Agricultural Assistants	
	1 Agricultural Trainee	
	6 Laboratory Attendants	
	1 Clerical Officer	
	1 Officer Attendant	

AGRICULTURAL CHEMISTRY DIVISION

Divisional Scientific Officer (Agricultural Chemistry)	L. C. Lam Thuon Mine, B.Sc. Chem. (London)	
Scientific Officer (Agricultural Chemistry)	N. N. Ramanjooloo, B.Sc. (Hons.) Chemistry (Delhi)	On leave
	A. H. Mohungoo, B.Sc. (Hons.) Chemistry (Alighrah)	
	N. Coonjan, B.Sc. (Hons.) Bombay	
Senior Technical Officer (Scientific)	Miss O. C. Wan Hok Chee, Dip. Agr. & Sugar Technology, Univ. of Maur.	
In addition there were:	1 Technical Officer (Scientific)	
	1 Extra Technical Officer	
	1 Field Assistant	
	1 Senior Laboratory Attendant	
	7 Laboratory Attendants	
	1 Clerical Assistant	

ANIMAL PRODUCTION DIVISION

Divisional Scientific Officer (Animal Husbandry)	B. Hulman, B.Sc. Agr. (Allahabad), Master of Philosophy (Reading)	
Scientific Officer (Animal Husbandry)	L. K. Ma Poon, B.Sc. (Hons.) Agr. (Ife) Dip. Agr. (Maur.)	
	A. A. Boodoo, B.Sc., Agr. (Addis Abeba)	
	H. Gaya, B.Sc. (Agr. (Allahabad),	On leave

APPENDIX I — *continued*

<i>Appointment</i>	<i>Name</i>	<i>Remarks</i>
In addition there were:	1 Technical Officer (Agriculture)	
	1 Technical Officer (Livestock)	
	1 Higher Clerical Officer	
	1 Typist/Stenographer	
	1 Office Attendant	
ANIMAL HEALTH DIVISION		
Principal Veterinary Officer	M. F. Mosaheb, B.V.Sc., B.Sc. and A.H. (Punjab), M.Sc. Tropical Veterinary Science (N. Queensland)	
Veterinary Officer	... R. C. S. Fokeer, B.V.Sc. & A.H. (Bombay) D.T.V.M. Edinburgh	On leave
Veterinary Officer	... L. L. Beeharry, B.V.Sc. & A.H. (Uttar Pradesh) M.Sc. Virology (Kansas)	
	D. Sibartie, B.V.M. (Nairobi)	
	H. Jhoree, Doctor of Vet. Medicine (USSR)	
	R. Deenoo, Bachelor of Vet. Medicine & A.H. (India)	
	J. Maudarbaccus, Bachelor of Vet. Medicine (India)	
	I. L. Prayag (Temp.) Bachelor of Vet. Medicine (Kampala)	
	V. S. Juggessur (Temp.) B.V.Sc. & A.H. (Haryana)	
Laboratory Technologist ...	L. H. R. Maurice, Dip. Agr. Maur.) C.G.L.I. (Sugar Manufacture)	
	A. K. Matabadul, B.Sc. (Hons.) Microbiology (Bombay)	
Senior Technical Officer (Livestock)	M. A. Bhunnoo, Dip. Agr. (Maur.)	
Senior Technical Officer (Agriculture)	M. Govendasamy, Dip. Agr. (Maur.) B.Sc. (Plant & Animal Protection) (Louisana State Univ.)	
	D. Ramessur, Dip. Agr. (Maur.)	

APPENDIX I — *continued*

<i>Appoiutment</i>	<i>Name</i>	<i>Remarks</i>
In addition there were:	4 Technical Officer (Livestock)	1 on leave
	3 Technical Officers (Scientific)	
	10 Senior Technical Assistants (Livestock)	
	16 Technical Assistants (Livestock)	
	5 Agricultural Assistants	
	1 Senior Laboratory Attendant	
	6 Laboratory Attendants	
	1 Executive Officer	
	2 Clerical Officers	
	5 Clerical Assistants	
	2 Typist/Stenographers	
	4 Office Attendants	

DAIRY CHEMISTRY DIVISION

Divisional Scientific Officer (Dairy)		Vacant
Scientific Officer (Dairy Chemistry)	P. Mardamootoo, B.Sc. (Hons.) Chem. (Delhi) M.Sc. Chem. (Delhi)	On leave
	J. F. S. Ng Man Sun, B.Sc. (Hons.) Chem. (Manchester)	Officer in charge (Dairy)
In addition there were:	4 Technical Officers (Scientific)	
	2 Agricultural Assistants	
	4 Laboratory Attendants	
	1 Clerical Assistant	
	1 Typist/Stenographer	

EXPERIMENTAL STATIONS

Agricultural Superintendent	S. Y. E. Doomun
Senior Technical Officer (Agriculture)	A. A. M. Osman, Dip. Agr. (Maur.)
	Y. L. Kong Ting Lun, Dip. Agr. (Maur.)
	A. C. Chan Hing Chong, Dip. Agr. (Maur.)
	A. C. Gouges, Dip. Agr. (Maur.)
	L. C. M. Li Ting Wai, Dip. Agr. (Maur.)
	F. S. Lam Kee, Dip. Agr. (Maur.)
	J. Dindoyal, B.Sc. Agr. (Poona)
	D. Gya, B.Sc. (Hons.) Agr. (Poona)
	S. Bissessur, B.Sc. Botany (Madras)

APPENDIX I—*continued*

<i>Appointment</i>	<i>Name</i>	<i>Remarks</i>
In addition there were:	12 Technical Officers (Agriculture)	
	1 Extra Technical Officers (Agr.)	
	6 Senior Technical Assistants (Agr.)	
	3 Senior Field Assistants	
	1 Field Assistant	
	17 Technical Assistants (Afr.)	1 on leave
	9 Agricultural Assistants	
	1 Technical Assistant (Livestock)	
	1 Agricultural Trainee	
	3 Officers giving assistance at C.O. level	
	29 Clerical Assistants	2 giving assistance at C.A. Level
	1 Typist/Stenographer	
	9 Office Attendants	

LIVESTOCK BREEDING STATIONS

Agricultural Superintendent	Y. Amjaud, Dip. Agr. (Maur.)
Senior Technical Officer (Agriculture)	A. Pooloo, Dip. Agr. (Maur.) T. K. Ah Keng, Dip. Agr. (Maur.) S. M. Sheik Hossen, M.Sc. Agr. (Kiev)
Senior Technical Officer (Livestock)	R. Fakim, B.Sc. Agr. (Allahabad)
In addition there were:	1 Technical Officer (Agriculture)
	2 Technical Officers (Livestock)
	1 Extra Technical Officer (Livestock)
	1 Senior Field Assistant
	1 Field Assistant
	4 Senior Technical Assistants (Agriculture)
	1 Senior Technical Assistant (Livestock)
	2 Technical Assistants (Agriculture)
	10 Technical Assistants (Livestock)
	9 Agricultural Assistants
	1 Agricultural Trainee
	1 Executive Officer
	1 Clerical Officer
	6 Clerical Assistants
	1 Typist/Stenographer
	6 Officer Attendants

<i>Appointment</i>	<i>Name</i>	<i>Remarks</i>
ENGINEERING DIVISION		
Principal Agricultural Engineer	A. R. Satar, B.Sc. Agr. Eng. (Israel) M.I. Agr. E., Dip. Agr. (Maur.)	
Senior Agricultural Engineer / Agricultural Engineer	N. Toolsee, B.E. Agr. (Udaipur) S. Purmanand, B.E. Agr. (Udaipur) S. J. Deschanel, M.Sc. (Mechanical Eng.) Astrahkan Fisheries Inst.	
Assistant Agricultural Engineer	M. Morad, Dip. Agr. (Maur.)	
In addition there were :	3 Technical Officers (Engineering) 1 Field Assistant 1 Executive Officer 1 Clerical Officer 1 Clerical Assistant 1 Office Attendant	
FIELD SERVICES DIVISION		
Senior Agricultural Superintendent	M. Sooltangos, Dip. Agr. (Maur.)	
Agricultural Superintendent	S. Fakim, Dip. Agr. (Maur.) C.G.L.I. (Sugar Manufacture)	
Senior Technical Officer (Agriculture)	S. Panyandee, M.Sc. Agr. (Bucharest) Mrs. F. Lallmahomed-Ciechanowski, M.Sc. Agr. (Engineering) (Poland)	
In addition there were :	1 Technical Officer 3 Technical Assistants (Agriculture) 1 Technical Assistant (Livestock) 4 Agricultural Assistants 1 Clerical Officer 1 Officer giving assistance at C.O. level 8 Clerical Assistants 1 Office Attendant	
EXTENSION SERVICES DIVISION		
Scientific Officer (Agro-nomy)	S. P. Mauree, B.Sc. Agr. (Madras)	On leave
Scientific Officer (Animal Husbandry)	G. Naidoo, B.V.Sc. & A.H. (India)	Acting D.S.O. Extension

APPENDIX I — *continued*

<i>Appointment</i>	<i>Name</i>	<i>Remarks</i>
Agricultural Superintendent	S. P. Vythilingum, Dip. Agr. (Maur.)	
Senior Technical Officer (Agriculture)	I. Sassa, Dip. Agr. (Maur.) R. Gohabar, B.Sc. Agr. (Sind.) J. C. Appapoulay, Dip. Agr. N. Teeluck, Dip. Agr. (Maur.) Lee Kien Vong, Dip. Agr. (Maur.) D. Dummur, Dip. Agr. (Maur.) B. A. C. D. Gumani, B.Sc. Agr. (India) R. Kandhai, B.Sc. Agr. (India) M. Aumeer, B.Sc. Agr. (Punjab) Agricultural Univ. D. Ragobar, B.Sc. Agr. (Punjab Univ.) S. Bisnauthsing, B.Sc. Agr. D. Boodhun, B.Sc. Agr. (India)	On leave
In addition there were :	25 Technical Officers (Agr.) 3 Technical Officers (Livestock) 1 Senior Field Assistant 7 Field Assistants 4 Technical Assistants (Agriculture) 29 Agricultural Trainees 1 Agricultural Assistant 1 Publicity Assistant 1 Clerical Officer 4 Clerical Assistants 2 Office Attendants 2 Typist/Stenographers	2 on leave 1 on leave

PROJECTS IMPLEMENTATION DIVISION

Divisional Scientific Officer (Agriculture)	K. Ramdaursing, B.Sc. (Hons.) Agr. & A.H. (U.P. Ag.) Dip. Agr. (Maur.)	
Agricultural Superintendent	B. Nundloll, London Matriculation	
In addition there were :	2 Technical Officers (Agriculture) 1 Surveyor 1 Surveyor Assistant 2 Junior Draughtsman 2 Printing Machine Operators 1 Field Assistant 2 Clerical Assistants 1 Office Attendant 1 Typist/Stenographer	

<i>Appointment</i>	<i>Name</i>	<i>Remarks</i>
LAND USE DIVISION		
Scientific Officer (Horticulture)	I. Rajkomar, B.Sc. (Hons.) Agr. (Udaipur) M.Sc. (Crop Science) Univ. of Saskatchewan	
Agricultural Superintendent	C. S. Amide, Dip. Agr. (Maur.) C.G.I.L. (Sugar Manufacture)	
In addition there were:	3 Technical Officers	
	2 Field Assistants	
	1 Agricultural Trainee	
	1 Clerical Officer	Giving assistance at C.O Level
	2 Clerical Assistants	
	2 Office Attendants	
AGRICULTURAL SERVICES — RODRIGUES		
Agricultural Superintendent		Vacant
Scientific Officer (Soil Conservation)		Vacant
Scientific Officer (Animal Husbandry)		Vacant
Senior Technical Officer	John Franklin Kwet-On, Dip. Agr. (Maur.) Joseph Wilson Tolbize, Dip. Agr. (Maur.)	
In addition there were:	2 Technical Officers	(on tour service)

APPENDIX II

Composition of Principal Boards and Committees

(i) BOARD OF AGRICULTURE, NATURAL RESOURCES AND THE ENVIRONMENT

The Permanent Secretary, Ministry of Agriculture, Natural Resources and the Environment — *Chairman*

The Chief Agricultural Officer

The Conservator of Forests

Mr. R. Yat Sin, representative of the Ministry of Finance

Mr. G. Danjoux, representative of the Ministry of Housing, Lands and Town and Country Planning

Mr. B. T. Barosee, representative of the Ministry of Cooperatives and Cooperative Development

Mr. S. Hossenbux, representative of the Ministry of Labour and Industrial Relations

The Honourable L. C. N. Guimbeau, M.L.A.

The Honourable A. R. N. A. Peeroo, M.L.A.

The Honourable Mrs. Ghislaine Henry, M.L.A.

Dr. the Honourable A. S. Kasenally, M.L.A.

Representatives of Planters

Mr. I. Bundhoo

Mr. H. Jhummun

Mr. A. Cambier

Mr. Robert Antoine, C.B.E., representative of the Mauritius Sugar Industry Research Institute

Mr. J. Manrakhan, representative of the University of Mauritius

Mr. A. Vallet, representative of the Chamber of Agriculture

Mr. Jaynarain Dhowtall, O.B.E., representative of the Mauritius Co-operative Agriculture Federation Limited

(ii) CANE PLANTERS AND MILLERS ARBITRATION AND CONTROL BOARD

Mr. L. E. Venchard, Q.C. — *Chairman*

Mr. A. I. Oozeerally, Administrative, Officer Ministry of Agriculture, Natural Resources and the Environment — representative of the Ministry of Agriculture, Natural Resources and the Environment

Mr. A. Raouf Bundhun, Independent Member

Mr. Serge Staub

Mr. Theo Maigrot

} Representatives of Millers

Mr. Balkrishna Ramphul, Representative of planters cultivating cane on less than 30 arpents of land

Mr. Goburdhun Ramnarain, Representative of planters who are members of Credit Cooperative Societies

APPENDIX II — *continued*

(iii) TOBACCO BOARD

A Principal Agricultural Officer—*Chairman*

The Commissioner of Excise—*Vice-Chairman*

The General Manager of the Board

The General Manager, British-American Tobacco Co. (Mauritius) Ltd.,
or his representative

The Managing Director, Amalgamated Tobacco Corporation (Mauritius)
Ltd., or his representative

Mr. Oomar Mauharbaccus

Mr. Beewa Mahado

Mr. Aneerood Purgass

Mr. Ikbai Roy

Mr. P. Shibchurn

Mr. Paramhans Sooknah

(iv) LAND SETTLEMENT COMMITTEE

The Divisional Scientific Officer (Land Use)—

Honourable L. C. N. Guimbeau, M.L.A.

Mr. A. R. N. A. Peeroo, M.L.A.

Mr. G. Naidoo, Acting Divisional Scientific Officer (Extension)

A representative of the Ministry of Housing, Lands and Town and
Country Planning

A representative of the Ministry of Cooperatives and Development

Mr. Allan Cambier

Mr. C. S. Amide, Agricultural Superintendent

(v) TEA BOARD

The Permanent Secretary, Ministry of Agriculture, Natural Resources
and the Environment or his representative—*Chairman*

Mr. R. Ramyeed, Principal Finance Officer, representative of the Ministry
of Finance

The Registrar of Cooperative Societies or his representative

The General Manager of the Tea Development Authority

Mr. Claude Giraud, representative of the Chamber of Agriculture

Mr. J. Ramdin

Mr. L. P. de Maroussem } Representatives of Manufacturers

Mr. Seewoonundun Chatoory, Representative of Planters

Mr. Gianchand Beechoo, Representative of Metayers

Mr. H. R. K. Aubdool

Mr. D. Gungadeen } Two other persons

APPENDIX II — *continued*

(vi) SUGAR MILLERS DEVELOPMENT FUND COMMITTEE

Mr. Lutchun Purmessur, Permanent Secretary, Representative of the Minister of Agriculture, Natural Resources and the Environment—*Chairman*

Mr. Dipnarain Manna, Administrative Officer, Representative of the Minister of Finance

Mr. C. Couacaud

Mr. Pierre Dinan

Mr. Cyril Lagesse

Mr. J. Leclezio

Mr. E. P. G. White

} Representatives of Millers

(vii) SUGAR PLANTERS DEVELOPMENT FUND COMMITTEE

Mr. Radha Mohun Hurdowar, Principal Assistant Secretary, Representative of the Minister of Agriculture, Natural Resources and the Environment—*Chairman*

Mr. Dipnarain Manna, Administrative Officer, Representative of the Minister of Finance

Mr. Chiranjive Moti, Registrar of Cooperative Societies, Representative

Mr. P. Kisnah, Economist, Representative of the Minister of Economic Planning and Development

Mr. J. Gopee

Mr. B. Boolakee

Mr. B. Beeharry

Mr. H. Ruhee

Mr. M. P. Kisnah

} Representatives of Planters

(viii) SUGAR INDUSTRY DEVELOPMENT FUND COMMITTEE

Mr. Lutchun Purmessur, Permanent Secretary, Representative of the Minister of Agriculture, Natural Resources and the Environment—*Chairman*

Mr. Dipnarain Manna, Administrative Officer, Representative of the Minister

Mr. E. P. G. White

Mr. Cyril Lagesse

Mr. Rafic M. Osman

Mr. Balram Beeharry

Mr. Ramtohul Aukel

APPENDIX II — *continued*

(ix) SUGAR PLANTERS MECHANICAL POOL CORPORATION BOARD

Mr. R. Balgobin—*Chairman*

Mr. D. Manna, Administrative Officer, Representative of the Ministry of Finance

Mr. C. Moti, Registrar of Cooperative Societies and Co-operative Development

Mr. G. Naidu, Acting Divisional Scientific Officer, Representative of the Ministry of Agriculture, Natural Resources and the Environment

Mr. C. Couacaud, representative of the Sugar Industry

Mr. T. Mohit

Mr. T. Ramphul

} Representative of Small planters

(x) TEA DEVELOPMENT AUTHORITY

Mr. Y. St. Guillaume—*Chairman*

The Permanent Secretary, Ministry of Agriculture, Natural Resources and the Environment—*Vice-Chairman*

A Principal Agriculture Officer (representing the Ministry of Agriculture, Natural Resources and the Environment)

The Registrar of Cooperative Societies

The Chairman of the Tea Board

Mr. Beejaye Ghoorah, Economist (representing the Ministry of Finance)

Mr. L. Philippe de Maroussem (representing the Chamber of Agriculture)

Mr. Deochand Gungah, (representing the Federation of Credit and Tea Marketing Cooperative Societies)

Mr. Peter White.

(xi) AGRICULTURAL MARKETING BOARD

Mr. T. Callychurn—*Chairman*

Mr. G. Kooraram—*Vice-Chairman*

Official Members

The Chief Agricultural Officer (representing the Ministry of Agriculture, Natural Resources and the Environment)

A Principal Finance Officer (representing the Ministry of Finance)

Mr. N. Bundhun, Administrative Officer (representing the Ministry of Commerce and Industry)

The Registrar of Cooperative Societies or his representative

Unofficial Members

Mr. Mahmood Edah Tally

Mr. P. Maureemootoo

Mr. M. K. Ng Wong Hing

Mr. L. Ramdin, M.B.E.

Mr. Jagnarain Dhowtall, O.B.E.

Mr. Olaganaden Vassoo Vythilingum

APPENDIX III

Legislation

Acts

- No. 31 of 1978 ... The Chemical Fertilizers Control Act 1978
- No. 38 of 1978 ... The Chemical Fertilizers Control (Amendment) Act 1978
- No. 39 of 1978 ... The Irrigation Authority Act 1978

Government Notices

- No. 16 of 1978 ... The Animal (Poultry) Feed Control Regulations 1978
- No. 33 of 1978 ... The Pesticides (Packaging and Labelling) Regulations 1978
- No. 37 of 1978 ... The Sugar Industry Labour Welfare Fund (Rate of duty) Order 1978
- No. 38 of 1978 ... The Animal Diseases (Control) Regulations 1978
- No. 74 of 1978 ... The Mauritius Society for the Prevention of Cruelty to Animals Rules 1978
- No. 112 of 1978 ... The Mauritius Sugar Industry Research Institute (Rates of Cess) Order 1978
- No. 127 of 1978 ... The Sugar Export Duty Order 1978
- No. 132 of 1978 ... The Meat Authority (Registration of Livestock) Regulations 1978
- No. 156 of 1978 ... The Registration of Livestock (Specified Day) Order 1978
- No. 173 of 1978 ... The Sugarcane (Specification of Varieties) Order 1978
- No. 213 of 1978 ... The Tea Industry Control (Rate of Cess) Order 1978
- No. 246 of 1978 ... The Mauritius Sugar Industry Research Institute (Rates of Cess) (No. 2) Order 1978
- No. 247 of 1978 ... The Animal Diseases (Amendment) Regulations 1978

APPENDIX IV

List of Publications and contributions to literature by officers of the
Agricultural Services during 1978

<i>Name of Author</i>	<i>Title of Paper</i>	<i>Name Vol. Page Nos. of Periodical in which published</i>
B. Hulman and E. Owen	Determination of the apparent dry matter digestibility of "acacia" <i>Leucaena Leucocephala</i> using goats.	Revue Agricole et Sucrerie de l'Île Maurice, Vol. 57, pages 111-114
B. Hulman, and E. Owen and T. R. Preston	Comparison of <i>Leucaena leucocephala</i> and groundnut cake as protein sources for beef cattle fed <i>ad libitum</i> molasses/urea in Mauritius.	Tropical Animal Production, Vol. 3, Pages 1-8.
H. Gaya, B. Hulman and T. R. Preston	Effect of two methods of restricted suckling on performance of the cows and growth rate of the calves.	Tropical Animal Production, Vol. 3, pages 118-124.
A. Boodoo, B. Hulman, T. R. Preston and R. A. Leng	Effect of an anti-protozoal agent on performance of growing calves fed a molasses-based diet.	Tropical Animal Production, Vol. 3, pages 134-139.
Hammes, C. ...	Estimation de l'efficacité du contrôle exercé par Rhabdionvirus oryctes (HUGER) sur oryctes rhinoceros (L) par l'étude des variations de dégâts sur les cocotiers de l'Île Maurice	Revue Agricole et Sucrerie de l'Île Maurice, 1978, 57, 4-18
Monty, J. ...	The Coconut palm Rhinoceros beetle <i>Oryctes rhinoceros</i> (R) (Col, Dynastidae) in Mauritius and its control.	Revue Agricole et Sucrerie de l'Île Maurice 57 (2)
Lallmahomed, G.M. and Ricand, C.	Root versus stem inoculation in pathogenicity tests and in the assessment of resistance to bacterial wilt in tobacco and tomato	In Proc. 4th Int. Conf. Plant Pathology, Bacteria, Angers 857-862.
Projects Division	Northern Plains Irrigation Pilot Project	PROSI-Sept 1978 - No 116 P 22 and 23.

APPENDIX V

Conversion Table

1 Arpent	...	1,043 acres
1 Gaulette	...	10.61 feet
1 Metric Ton	...	1,000 kilos
1 Long Ton	...	1,016 kilos
1 Pound Avoirdupois	...	454 grams
1 Kilo	...	1,000 grams
1 Hundred weight	...	50.803 kilos
1 Cord	...	92.82 cubic feet
1 Imperial Gallon	...	4.45 litres
1 Rupee	...	8.20 pence

